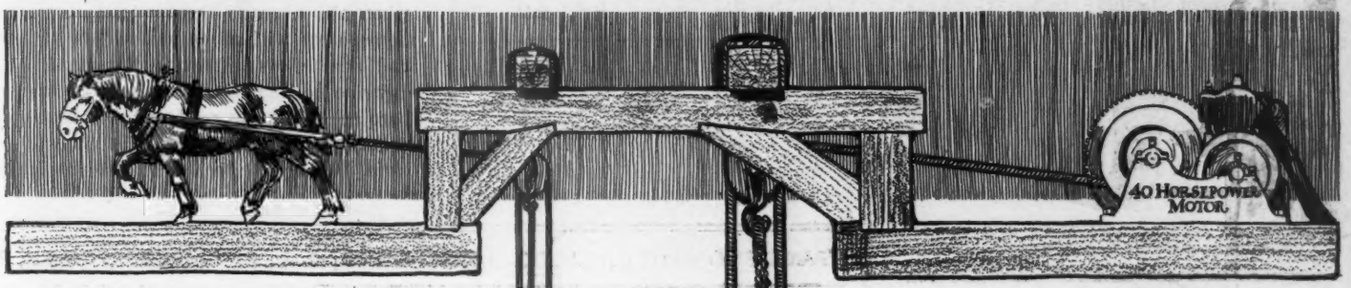
VOL. XVII, No. 9 CHICAGO, MARCH 3, 1910 $3.00 PER YEAR

MOTOR AGE

HORSEPOWER—THE PROBLEM OF THE INDUSTRY



HORSEPOWERIZATION is an art which had its inception with the gasoline motor, and since then has been going through a phenomenal process of evolution. Horsepower, today, according to the manufacturer's catalog, is one of the vaguest quantities; and according to the best accepted formula it is almost as uncertain. To the person whose conception of 1 horsepower is limited to raising 3,300 pounds 1 foot in 1 minute the catalog rating of 50 or 70 horsepower has little value or meaning.

It is generally considered as anarchistic to upset any accepted mode of doing things or any law without offering a feasible substitute, and it will be equally anarchistic to criticize the present irreconcilable horsepower rating of the 100 or 200 motor car ratings in America without at least suggesting something that might prove the better of two evils, if incapable of serving as a panacea for the condition. Nothing will show more conclusively the dilemma in which a car buyer finds himself regarding horsepower than a comparison of some catalog ratings of different makes, at the same time glancing at the cylinder sizes, and it must be understood that the majority of factories have not arbitrarily adopted these ratings. In some cases they have been determined by brake test of the motors; in others, the electric dynamometer has been the means adopted; in a third, the air dynamometer has been used, and no matter what the rating there is generally some cogent reason why it should be adopted. This is not true in every case, however, as some makers have announced the horsepower of their motor while it was yet on blue prints, and there had been not a single motor made to determine what its horsepower would be.

One horsepower is defined as raising 33,000 pounds 1 foot in 1 minute.

From the viewpoint of the buyer nothing could be more chaotic than the labyrinth of present ratings. Motor Age has listed practically all American cars on the following pages, giving after the name of the car the horsepower as announced by the manufacturer; following this comes the number of cylinders, which is later followed by the bore and stroke and A. L. A. M. rating.

Viewing these motors in the light of the A. L. A. M. horsepower rating, the buyer is not definitely answered on the horsepower basis, as is shown by the following motors with 4½-inch bores, which, according to this rating, gives a horsepower rating of 32.4 for each of them, irrespective of the length of the stroke, the stroke not entering into the formula excepting in that this horsepower rating was based on a piston speed of 1,000 feet per minute, so that the longer the stroke the fewer the number of revolutions per minute, or speed of the motor.

	Bore Inches	Stroke	Horsepower
Elmore	4½	4	32.4
Corbin	4½	4¼	32.4
Jackson	4½	4½	32.4
Stearns	4½	4⅝	32.4
Pullman	4½	4¾	32.4
Auburn	4½	5	32.4
Mora	4½	5⅛	32.4
Premier	4½	5¼	32.4
Belden	4½	5½	32.4

In the above nine makes of cars with four-cylinder motors of the same bore, different types of cylinders are used—one uses the L design, with both valves on one side; the Jackson has the valves located at angles of 35 degrees in the cylinder heads; the Premier uses a T-head cylinder, that is, with valves on opposite sides; yet they are all given the same horsepower rating, which is 32.4 on a basis of

"Today the common-sense buyer asks for the bore and stroke as well as horsepower"

piston speed of 1,000 feet per minute. This means that they will generate the 32.4 horsepower with different crankshaft revolutions. For example, in a motor with 4-inch stroke the piston travels 8 inches per revolution, so that this motor should revolve at 1,500 revolutions per minute to give a piston speed of 1,000 feet per minute. A motor with 5-inch stroke must have a crankshaft rotation of 1,200 per minute to give the called for rating, and one with a 5½-inch stroke must turn over at practically 1,090 revolutions. The average car buyer fails to take into consideration this question of crankshaft rotation, and when he buys a motor with 5-inch stroke and 5-inch bore he does not stop to realize that when he is told it has a formula rating of 40 horsepower that the crankshaft must rotate at 1,200 revolutions per minute in order to produce this.

It is these factors of piston speed and crankshaft revolutions per minute that have done so much to confuse the amateur in this horsepower problem, and it is questionable if it would not be more satisfactory to have this method of rating dropped and instead give the bore and stroke, or better still, the piston displacement, by piston displacement being meant the number of cubic inches cylinder space in the four cylinders obtained by taking the area of each piston head in square inches, multiplying by the stroke in inches, and multiplying by the number of cylinders.

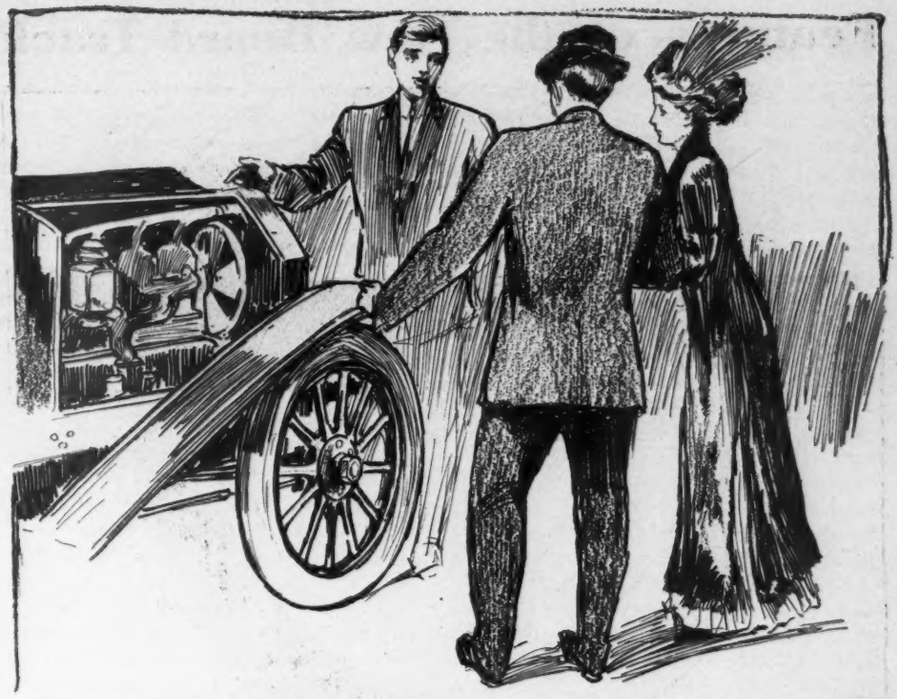
Piston displacement is at present used as a method of classifying cars for contests and, although it is difficult to compute the piston displacement, it is questionable if it would not prove simpler than the present horsepower system, because there are very few who are prepared to estimate the horsepower on a moment's notice. Motor Age published on page 15, issue February 3, a complete table showing piston displacement in cubic inches for all sizes of four-cylinder motors manufactured in America, which table serves as a ready method of comparing the cylinder sizes of various motors, and it is no impossible act of the imagination to conceive the time when, instead of speaking of a 4 by 4-inch motor it will be designated one with 200 cubic inches piston displacement, rather than 25.6-horsepower, 20-horsepower, 22-horsepower, 28-horsepower or 30-horsepower, as is the case at the present time. It is a fact that cylinder sizes are now more common to the American public than they were. The days are no more when the average buyer simply asks the horsepower without any thoughts of bore and stroke ever entering his mind. Today the common-sense buyer asks for the bore and stroke as well as the horsepower, and those who are going into the subject more thoroughly are taking into considera-

TABLE SHOWING CATALOG HORSEPOWER, A. L. A. M. HORSEPOWER, THE

Name of car	H.P.	No. of Cyl.	Bore	Stroke	A.L.A.M. H.P.
American	50	4	5⅜	5½	46
American Simplex	50	4	5	5	40
Atlas	20	3	4½	4½	24.3
Atlas	20	2	4½	4½	15.2
Atlas	60	4	5	5	40
Adams-Farwell	50	5	5½	5	60.5
Anhut Six	30	6	3½	4	29.4
Auburn	24	2	5¼	5	22
Auburn	35-40	4	4½	5	32.4
Alco	16	4	3 15-16	4¾	24.8
Alco	22	4	3 15-16	4¾	24.8
Alco	40	4	4¾	5½	36.1
Alco	60	6	4¾	5½	54.1
Autocar	25.6	4	4	4½	25.6
Apperson	30.4	4	4⅜	5	30.6
Apperson	30	4	4⅜	5	30.6
Apperson	40	4	4¾	5	36.1
Apperson	55	4	5¾	5	53
Apperson	40	6	4½	5	48.6
Apperson	50	4	5½	5	48.4
Anhut Six	40	6	3½	4	29.4
Abbott-Detroit	25.6	4	4	4½	25.6
Anchor	35	4	4¼	5	28.9
A-K	35	4	4⅜	5	36.1
A-K	48	4	5¼	6⅛	44.1
Bailey	20	4	3¾	4	22.5
Belden	50	6	4½	5½	48.6
Belden	70	6	5	5½	60
Billy	20	4	3⅜	4½	18.2
Burdick	60	6	5	5	60
Badger	30	4	4	4	25.6
Buick, No. 10	18	4	3¾	3¾	22.5
Buick, No. 19	24	4	4½	4½	28.9
Buick	22	2	4½	5	16.2
Buick, No. 17	30	4	4½	5	32.4
Beyster-Detroit	22	4	3¼	3⅜	16.9
Buffalo	20	4	4	4	25.6
Buffalo	16-18	2	4½	4	16.2
Buffalo	30	4	4¼	4½	28.9
Buffalo	50	4	4⅞	5½	38
Black-Crow	25	4	3⅞	4½	24
Black-Crow	35-40	4	4¼	4¾	29.9
Brush	10	1	4	5	6.4
Corbin	30	4	4½	4¼	32.4
Columbia	32.4	4	4½	4 7-10	24.3
Chalmers	30	4	4	4½	25.6
Chalmers	40	4	4½	5	32.4
Chalmers	40	4	5	4¾	40
Cadillac	30	4	4¼	4½	28.9
Clark 30	30	4	4	4	25.6
Clark 30	40	4	4½	5	32.4
Colburn	30	4	4¼	4½	28.9
Cino	40	4	4⅜	5	30.6
Continental	35	4	4⅜	4½	30.6
Croxton-Keeton	30	4	4¼	4½	28.9
Cameron	24	4	3⅞	3½	24
Cameron	36	6	3⅞	3¾	36.6
Cartercar	25	4	4	4	25.6
Cartercar	30-35	4	4¼	4½	28.9
Chadwick	60	6	5	6	60
Cole 30	30	4	4	4	25.6
Coates-Goshen	32	4	4½	5	32.4
Coates-Goshen	45	4	5	5¾	40
Courier	22.5	4	3¾	4½	22.5
Crawford	28	4	4½	4½	28.9
Crawford	45	4	5	5	40
Crawford	50	4	5	5½	40
Detroit-Dearborn	35	4	4⅛	4¾	27.2
Duryea	12-15	2	3¾	3¾	11.2
Diamond T	33	4	4¼	4½	28.9
Diamond T	50	4	5	5	40
Dorris	30	4	4¼	5	28.9
Demot	10	2	3⅝	3½	10.5
Elmore	36	4	4½	4	32.4
Everitt	30	4	4	4¾	25.6
E-M-F	30	4	4	4½	25.6
Empire	20	4	3½	4	19.6
Franklin	18	4	3⅜	4	18.2
Franklin	28	4	4¼	4	28.9
Franklin	42	6	4¼	4	43.8
Elmore	46	4	4	4½	25.6
Fuller	20-24	2	5⅛	4½	21
Fuller	35-40	4	4½	5	32.4
Fuller	30	4	4	4	25.6
Flanders	20	4	3⅝	3¾	20.2
Falcar	40	4	4½	5	32.4
Firestone-Colum.	24-26	4	4	4	25.6
Firestone-Colum.	34-36	4	4½	4½	32.4
Ford	20	4	3¾	4	22.5
Glide	45	4	4¾	5	36.1
Great Smith	45	4	4½	5	32.4
Great Western	30	4	4¼	5	28.9
Grout	40-45	4	4¾	5	36.1
Gaeth	40-45	4	4⅞	5¼	38
Grabowsky	30	2	5½	5	24.2
Haynes	30	4	4¼	5	28.9
Henry	35-40	4	4⅛	5¼	27.2
Herreshoff	24	4	3⅜	3¾	18.2
Hudson 20	22.5	4	3¾	4½	22.5
Halladay	24	4	3¾	4½	22.5
Halladay	30	4	4	4	25.6
Halladay	40	4	4½	5	32.4
Hupmobile	20	4	3¼	3⅜	16.9
Inter-State	40	4	4½	5	32.4
Jenkins	45	4	4¾	5½	36.1
Johnson	30	4	4¼	4½	28.9
Johnson	35-40	4	4½	5¼	32.4
Johnson	50	4	5	5¾	40
Jackson	25.6	4	4	4	25.6
Jackson	24	2	5¼	5	22
Jackson	30	4	4¼	4½	28.9
Jackson	32.4	4	4½	4½	32.4
Jackson	36.1	4	4¾	4¾	36.1
Knox	40	4	5	4¾	40
Knox	60	6	5	4¾	60
Knox	48	4	5½	5½	48.4
Krit	22½	4	3¾	4	22.5
Kenmore	16-18	2	4¼	4½	14.5
Keystone	30	6	3 9-16	4 1-16	20.4
Keystone	60	6	4½	5	48.6
Koehler	40	4	4¼	5	28.9
Kisselkar	30	4	4¼	4¼	28.9
Kisselkar	50	4	4⅞	4¾	38
Kisselkar	60	6	4¾	4¾	54.1
Klinekar	24-30	4	3¾	4¼	22.5
Klinekar	40-50	6	4 1-16	5	29.6
Locomobile	40	4	5	6	40
Locomobile	30	4	4½	4½	32.4

tion first of all the piston displacement.

Horsepower is a most uncertain quantity in a gasoline motor and is dependent on so many variables that it is almost certain to create confusion and breed dissatisfaction with many buyers. It is questionable if there is anything in connection with the motor car that is dependent on more uncertainties than is the horsepower rating. A drop of oil on the spark plug, a slight change in the tension of a valve spring, a particle of carbon on the valve seat, a cracked piston ring, the slightest leak at a gasket, and a score of other possible happenings can each result in a pronounced change in horsepower; and if in the design of a motor in which the bore and stroke are the same as in another motor, if any of the slightest details are neglected, the horsepower will not come up to that standard which it does in another motor in which due care has been given to all of these factors. So great, in fact, are the possibilities of changes in conditions in a gasoline motor that there



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is only one way of accurately determining the horsepower, and that is by a factory test in which the prony brake, the dynamometer, or some other form of testing is used. It is this uncertainty as to horsepower that the origin of discontinuing rating by horsepower is largely due.

The present method of rating horsepower, as adopted by the various manufacturers, frequently gives not the faintest idea of the power of the car. Two examples will prove this:

Car X, bore 5 inches, stroke 5½ inches, 30 horsepower.

Car Y, bore 5 inches, stroke 5 inches, 50 horsepower.

These are not two extremes, although their diversity is such that many might conclude they were. Here is a case of a larger motor rated at 30 horsepower in the maker's catalog, and one with a bore ½-inch less rated at 50 horsepower. In view of the fact that the one with the rating of 30 horsepower is a higher-priced machine than that with the 50 horsepower rating attached to it, it would appear that its motor should be a better made product and should give a higher efficiency, yet in the face of this it is rated 20 horsepower lower than the lower-priced one. This is but one of the scores of inconsistencies in horsepower ratings with which the buyers of America are face to face, and in many cases when they ask an explanation of the salesman as to the horsepower rating and the reasons therefore they are not given a satisfactory answer. Because of this there is every excuse for the unsettled feeling regarding the present horsepower situation, which feeling is growing from week to week and will continue to grow still more inquisitive.

NUMBER OF CYLINDERS AND BORE AND STROKE OF AMERICAN CARS

Name of car	H.P.	No. of Cyl.	Bore	Stroke	A.L.A.M. H.P.
Locomobile	38	4	4½	4½	32.4
Locomobile	60	4	5	6	40
Lambert	28	4	4	4	25.6
Lambert	35	4	4⅛	4½	27.2
Lambert	40	4	4½	5	32.4
Lion	30-35	4	4½	5	32.4
Leader	20	2	5	4½	20
Leader	30	4	4¼	4½	28.9
Lexington	35-40	4	4¾	5	36.1
Lexington	40-45	4	4¾	5	36.1
Luverne	40	4	4½	5	32.4
Lozier	33	6	3¾	5½	33.7
Lozier	45	4	6⅜	5¼	46
Lozier	50	6	4⅝	5½	51.6
Mitchell	30-35	4	4¼	5	28.9
Mitchell	50-60	6	4¼	5	43.8
Matheson	50	6	4½	5	48.6
Matheson	50	4	5	6	40
Marmon	32-40	4	4½	5	32.4
Maxwell	30	4	4¼	4¼	28.9
Maxwell	12	2	4	4	12.8
Maxwell	22	4	3¾	5	22.5
Marathon	30	4	4	4½	25.6
Marion	35	4	4¼	4½	28.9
Maryland	28	4	4¼	4	28.9
Mason	24	2	5	5	20
Mason	32	4	4½	5¼	27.2
Morse	24	4	4⅝	5	34.2
Morse-Radio	40	4	4¾	5	36.1
Mercer	30⅝	4	4⅝	4¾	30.6
Moon	30	4	4¼	5	28.9
Moon	45	4	4¾	5	36.1
Metz	12	2	3½	3¼	9.8
Mora	20	4	3¼	3½	16.9
Mora	40	4	4½	5⅛	32.4
Midland	35	4	4½	5	32.4
Midland	40	4	4½	5¼	32.4
Middleby	25	4	4	4	25.6
Moline	30	4	4	4½	25.6
Moline	35	4	4½	5	32.4
National	40	4	5	5 11-16	40
Oldsmobile	40	4	4¾	4¾	36.1
Oldsmobile	60	6	4¾	4¾	54.1
Overland	25	4	3¾	4½	22.5
Overland	40	4	4¼	4½	28.9
Oakland	30	4	4	4	25.6
Oakland	40	4	4½	5	32.4
Ohio	35-40	4	4¼	4¾	28.9
Peerless	50	6	4⅞	5½	57
Peerless	30	4	4⅞	5½	38
Premier	40	4	4½	5¼	32.4
Premier	60	6	4½	5¼	48.6
Pierce-Arrow	36	6	4	4¾	38.4
Pierce-Arrow	48	6	4½	4¾	48.6
Pierce-Arrow	66	6	5¼	5½	66.2
Packard	30	4	5	5½	40
Packard	18	4	4 1-16	5⅛	26.4
Pope-Hartford	41	4	4 5-16	5⅛	29.7
Parry	32-36	4	4¼	4½	28.9
Paige-Detroit	25	3	3¾	4	22.5
Palmer-Singer	60	6	4⅞	5½	57
Palmer-Singer	30	4	4½	4½	32.4
Pierce	30	4	4¼	5	28.9
Paterson	30	4	4	4	25.6
Pennsylvania	25	4	4¼	4¼	28.9
Pennsylvania	50	4	4⅜	5¼	36.1
Pennsylvania	75	6	4¾	5¼	54.1
Petrel	30	4	4⅜	4¾	30.6
Pittsburg	60	6	4¾	5¼	54.1
Powercar	30	4	4	4½	25.6
Pullman	25-28	4	4 1-32	5	26
Pullman	35	4	4½	4¾	32.4
Pullman	50	4	5¼	6	44.1
R. A. C.	50	6	4 3-16	4½	28
R. A. C.	30-35	4	4¼	4¾	28.9
Rambler	45	4	5	5½	40
Rambler	34	4	4½	4½	32.4
Reo	30-35	4	4	4½	25.6
Reo	20-22	2	4¾	6	18
Reo	10-12	1	4¾	6	9
Rogers	18	2	4¾	4	18
Richmond	22	4	3¾	4	36.1
Richmond	25	4	4	4	25.6
Rider-Lewis	30	4	4	4½	25.6
Rider-Lewis	45	6	4	4	38.4
Royal Tourist	48.4	4	5¼	6	44.1
Regal	30	4	4	4	25.6
Ranger	10-12	2	4 1-16	4	26.4
Sears	14	2	4⅛	4	13.6
Studebaker	40	4	4¾	5¼	36.1
Stoddard-Dayton	30	4	3⅞	4½	24
Stoddard-Dayton	40	4	4 3-16	5	28
Stevens-Duryea	35	6	4¼	4⅜	43.8
Stevens-Duryea	40	6	4⅜	4½	54.1
Stevens-Duryea	24	4	4¾	4½	36.1
Speedwell	50	4	5	5	40
Standard Six	50	6	4½	5	48.6
Staver	30	4	4	4	25.6
Staver	45	6	4	4	38.4
Sultan	12-15	4	3	4⅜	14.4
Sharp Arrow	40	4	5	5	40
Silent Sioux	35-40	4	4⅜	5	36.1
Senator	24	4	4	4	25.6
Simplicity	40	4	4⅜	5⅞	30.6
Springfield	40	4	5	4¾	40
Sterling	30	4	4	5	25.6
Sterling	35.40	4	4½	5½	28.9
Selden	36.1	4	4¾	5	36.1
Stearns	15-30	4	4½	4⅝	32.4
Stearns	30-60	4	5⅝	5⅞	46
Thomas	72	6	5½	5½	72.6
Thomas	28.9	4	4½	5½	28.9
Thomas	43.8	6	4¼	5½	43.8
Thomas	18.2	4	3⅝	4 5-16	18.2
Thomas	60	4	5¾	5½	53
Templeton DuBrie	20	2	4½	4½	....
Traveller	35	4	4 5-16	5¾	29.7
Velie	40	4	4½	5¼	32.4
Van Dyke	12	2	4⅜	4	15.3
Warren-Detroit	30	4	4	4½	25.6
Welch-Detroit	40	4	5	5	40
Whiting	20	4	3¼	3½	16.9
Whiting	40	4	4¼	5	28.9
White	20	4	3¾	5⅛	22.5
Winton	48.6	6	4½	5	48.6
Winton	60	6	5	5	60
Warren-Detroit	24-26	4	4	4½	25.6
Welch-Detroit	50	4	4⅝	5	34.2
Welch-Detroit	70	4	5½	6	48.4
Welch-Detroit	75	6	4⅝	5	51.6

Features of the New Board Track

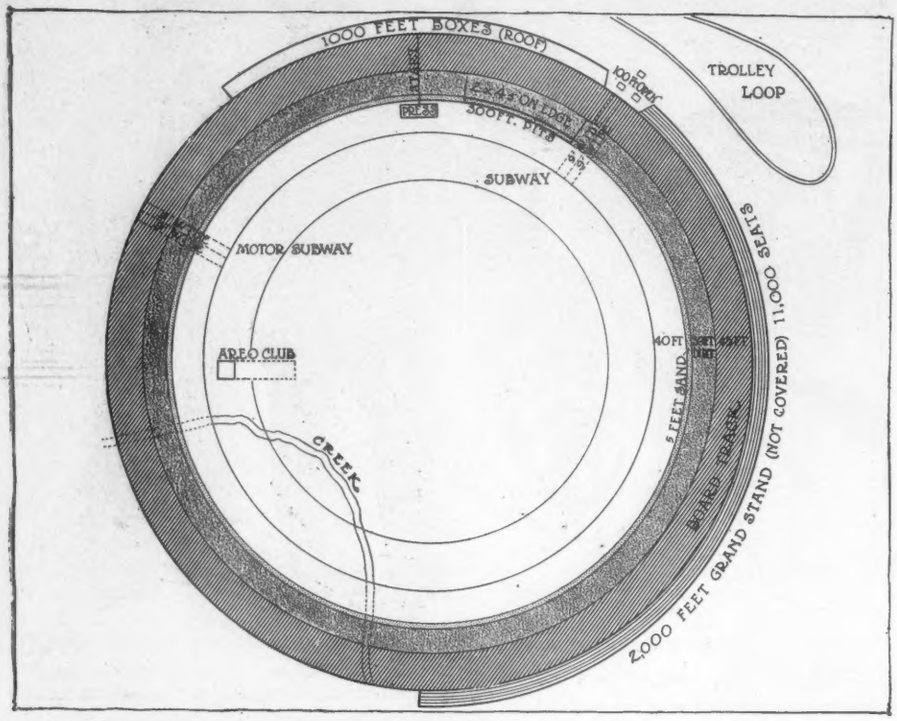


DIAGRAM SHOWING LAYOUT OF THE LOS ANGELES RACING PLANT

LOS ANGELES, CAL., Feb. 24—The Los Angeles circular 1-mile track is rapidly nearing completion, in fact it practically is completed as far as the board surface of this track is concerned, the grand stands, boxes and other necessaries not being completed. As has been already stated in Motor Age, this track is a perfect circle, measuring accurately 1 mile 1 foot in circumference 3 feet from the inside of the board track. The diagram herewith shows in general the layout. The driving track on which the cars will run is 45 feet wide and the outer edge of it is elevated 15 feet. Inside of this track is a 30-foot dirt track which might be termed a safety zone in case, through a tire bursting, or other accident, a racing machine would leave the plank surface. But the safety protections do not stop here, because inside of this dirt track comes a strip of sand 5 feet wide, the sand being for use in case of fire. Lastly comes the fourth neutral zone, namely, a 40-foot strip inside of which is a wire fence 3 feet high.

There are, thus, really four great circles which, beginning from the outside, are the track, the dirt strip, the sand strip and the neutral zone. This precaution at the inside should prove adequate. Racing cars, however, if accidents occur, may go out over the top of the track, but to avoid this the designers have placed two continuous steel rails along the outer fence. The first rail is 24 inches high, the second one is 7 inches higher than this. These rails are simply heavy trolley ones, and their use is apparent. Should a car attempt to leave the course it is prevented by these rails, a fact which was demonstrated at the recent opening at Atlanta.

Outside of the track comes the big circle of boxes and grand stands. The box section is 1,000 feet long, being practically one-fifth the track circumference. It has accommodation for 3,000 people and is roofed. The main grand stand is 2,000 feet in length and six rows deep, offering 11,000 seating capacity. This stand is not roofed.

In building the great board track timbers 2 inches by 4 inches are used, these being laid in the same direction as the car will travel. These timbers are Oregon pine and rest upon 12-inch cross sills at every 3 feet, as illustrated. The timbers forming the track are held to the cross sills by 3½-inch spikes A, and the timbers themselves are held in place by 5-inch spikes D, which pass entirely through two and partly through a third timber. These spikes are placed 8 inches apart, so that the timber surface on which the cars run is practically one mass, being bound by these huge nails. All told, 294 miles of this scantling is used. The track has called for 3,000,000 feet of Oregon pine, which was ordered in December. Active work was begun on the track proper February 1. The scantlings used are all sized, giving them reasonably smooth surfaces.

The general arrangements in connection with the track have been carefully worked out. Between one end of the boxes and the immense grand stand is the entrance with its ticket offices, the boxes being to the right and the grand stand to the left. There also is a passenger subway for those who desire to stand in the infield. One-third down on the track from this point is the car subway, it being two passages, each 9 feet wide, one for cars entering and the other for those leaving the inclosure. The six repair pits are located in front of the boxes and extend for 300 feet. They are located 40 feet back from the board track, this 40-foot space being covered by 2 by 4-inch timber, the same as on the track proper. Adjacent to the pits is a press stand. In the infield, almost diametrically opposite to the passenger subway, is a large building 450 feet long and 40 feet wide, which is the headquarters of the Aero Club of California. This will be used for a garage at the first meet. This building is located radially so as to offer the least obstruction to the view from the boxes and grand stands. Close to the Aero club quarters is a creek which offered certain difficulties in the construction of the track.

From the standpoint of location this motordrome is ¾ mile from the ocean and 1½ miles from Venice, with its population of 10,000. Its location with reference to Los Angeles is 11 miles distant. Adequate transportation facilities are offered by two trolley lines, one known as the Venice Short Line and the other the Playa del Rey road. These lines have built a suitable loop at the entrance. The ground is perfectly level, there being but a variation of 2 feet 1 inch between the highest and lowest points on the course. In order to make night driving possible electric arc lamps have been hung every 75 feet around the entire circuit.

For the 7 days of racing scheduled for the inaugural of the new track, April 8-10 and 13-17, thirty-seven events are carded, the most important contest being a 24-hour race which will be contested April 30-May 1. In the main the card is made up of stock chassis propositions, mostly short distance events of 5, 10 and 25 miles in length. However, there are four 100-mile races, one for the 161-230 class, another for the 231-300 class, a third for the 301-450 class and the fourth for the 451-600 class. This last named is expected to be the feature outside of the 24-hour event, the first prize in it being $1,000 in cash, with $500 for the second, $300 for the third and $200 the fourth. In addition to this there is a 2-hour race for stock chassis over 600 inches cubic displacement.

FIRST CLIMB OF YEAR

San Francisco, Cal., March 1—The first hill-climb of the season was held Sunday afternoon across the bay in Oakland under management of the Automobile Trades Association of Alameda County. The contest was held on the Oakland avenue grade of .6 mile. The weather was wet and consequently the time was not very fast, and the day was further handicapped by lack of competition in a number of the events. The greatest honors went to the Buick and Corbin cars. Frank Murray, driving a Buick 40 roadster and touring car and

a Buick 30 touring car, all fully equipped, took three first places, and in the 40 roadster also made the fastest time of the day. The Corbin took its class event, although without competition, and in the free-for-all equaled the best time of the day, previously established by the Buick 40. The Chalmers 40 and Hudson cars won uncontested events. The summaries:

RUNABOUTS, $1,000 AND UNDER

Car	Driver	Time
Hudson	C. Allen	1:06

RUNABOUTS, $1,501-$2,000

Buick 40	F. Murray	:52⅕
Auburn	F. Hurst	1:18⅘

RUNABOUTS, $2,001-$3,000

Chalmers 40	J. Bemb	:58⅘

TOURING CARS, $1,500 AND UNDER

Buick 30	F. Murray	1:00
Paterson 30	L. L. Gummow	1:15

TOURING CARS, $1,501-$2,000

Buick 40	F. Murray	1:04
Elmore	P. F. Gilliette	1:37

TOURING CARS, $2,001-$3,000

Corbin	A. Loughead	1:06⅕

FREE-FOR-ALL

Corbin	A. Loughead	:52⅕
Buick 40	F. Murray	:56
Maxwell	C. King	:57⅘
Chalmers 40	J. Bemb	1:03
Gillette Pup	P. F. Gillette	1:06

BEACH CARD MADE UP

Daytona, Fla., Feb. 26—Claim is made by the Florida East Coast Automobile Association that no uncertainty exists as to this year's beach meet, which has been scheduled for March 22, 23 and 24, and plans are rapidly being made for the annual speed carnival. The seriousness of the promoters' intentions was shown this week when a sanction for the meet was obtained from the American Automobile Association, which was followed by the publication of the racing program. The card will be made up of a 1-mile trial for the world's record of :28⅕, which was made in 1906 by Marriott in a Stanley steamer; the usual 2-mile-a-minute race, a 5-mile free-for-all, a 20-mile free-for-all, a 50-mile 160-230 stock chassis race, a 100-mile 231-450 stock chassis race, a 100-mile 451-600 stock chassis race, a 10-mile southern championship, a 10-mile Florida championship, a 20-mile free-for-all handicap and a 20-mile stock chassis handicap open to all classes. In a mile time trial and the 2-mile-a-minute race the competing cars must qualify by covering 5 miles at an average of :31 to the mile. The meet is being handled by T. E. Fitzgerald, secretary of the club at Daytona.

Chalmers the Glidden Scout

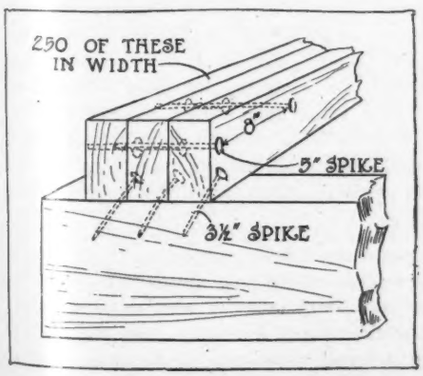
CHICAGO, Feb. 28—The route for the 1910 Glidden tour will be laid out by a Chalmers car, which has been officially appointed pathfinder by Chairman Butler, of the contest board of the American Automobile Association. There was lively bidding for the honor, several of the big concerns throughout the country making application to the national organization. The concession only was granted with the understanding that the company getting the job is not only to blaze the trail, but also agrees to enter three cars in the tour and start them. Besides having the honor of pathfinding the route, the Chalmers also will be the pilot car of the route proper. In all probability Billy Knipper will drive the car, which will leave Cincinnati before April 15. Dai Lewis, who has laid out the past three Glidden routes, again will be on the job. At the present time a Mitchell car driven by Frank Zirbies is making an unofficial trip over the tentative route, having left Cincinnati last Wednesday.

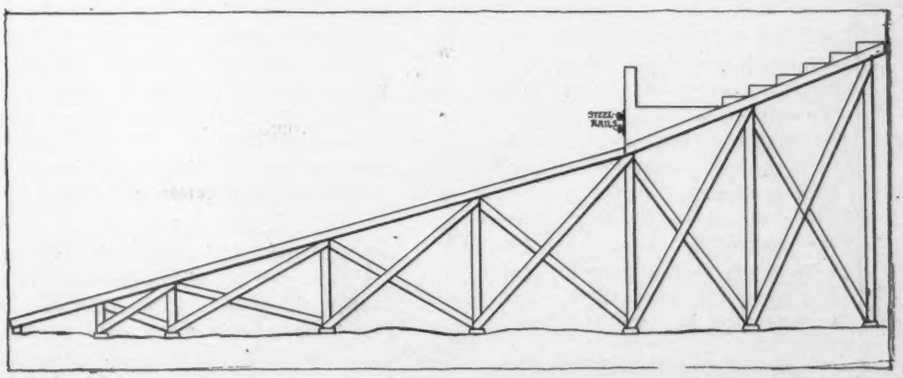
Chairman Butler's announcement reads as follows: "After a careful consideration of the competitive proposals submitted by a number of manufacturers for the privilege of furnishing the official pathfinding car for the 1910 Glidden tour, the contest board has awarded this privilege to the Chalmers Motor Co. of Detroit. The Chalmers car which is to lay out the route will commence its work some time during the month of April, as soon as the roads are in a fit condition to determine the most practicable route.

"The futility of the efforts of a car of another make than the Chalmers now attempting to go unofficially over the road and the unreliability of the road information which such car can obtain at this season of the year is self-evident. The roads over the proposed route of the tour are in such condition at the present time that the route which any car would have to take would of necessity include many detours and be entirely at variance with the route which will be selected by the Chalmers official pathfinding car when it goes over the territory in the proper season. Intending entrants in the tour should not be misled by the road reports from any self-appointed or unofficial pathfinding car making an unseasonable run, but should wait for the reliable and authentic information which will be contained in the reports of the official pathfinder. The contest board also contemplate the changing of the tentative route in some of its important particulars."

Since the announcement that the tour probably would start from Cincinnati and end at Chicago other cities have become aroused, and now Indianapolis has started a lively fight to get the start. At a recent meeting of the Indianapolis Trade Association each member pledged himself to send a letter to Chairman Butler urging the claims of the Hoosier metropolis. Besides this the association has enlisted the aid of the commercial and civic organizations of the city and the Indianapolis Motor Speedway Co. has offered its grounds for parking purposes. The Hoosiers have gone to the trouble of preparing several tentative routes for the consideration of the contest board. The most direct one from Indianapolis to Louisville is 114 miles in length, going through Columbus and Seymour, but it is easy to make a detour to the east or west if desired, which will increase the distance to 180 or 185 miles. Another very attractive way would be to Columbus, Seymour, Salem and Paoli to Louisville. From Paoli the route traverses the road between French Lick and Louisville, the greater portion of which is a macadam road which runs through a rugged and picturesque country. A third route suggested would be from Indianapolis to Martinsville, Bloomington, Bedford, Paoli and thence by way of French Lick to Louisville.

The Premier Motor Mfg. Co. has formally entered the first two cars in the Glidden. As in the 1909 event Nos. 1 and 2 will be carried by the two Premiers. At the recent show in Chicago, the entries were made with Samuel M. Butler, chairman of the contest board of the national association. While the Premier is the first to get in with entries, there is every reason to believe there will be a big early entry, for already manufacturers are beginning to clamor for blanks.





CONSTRUCTION OF TRACK BED AT LOS ANGELES AND DIAGRAM SHOWING BANKING AND LOCATION OF GRANDSTAND SEATS

Published Weekly
The CLASS JOURNAL COMPANY
1200 Michigan Avenue
CHICAGO
New York Office, 239 West 39th Street

MOTOR AGE

Subscription Rates
United States and Mexico, per year, $3.00
Other countries including Canada, $5.00

Entered as Second-Class Matter September 19, 1899 at the Postoffice at Chicago, Illinois, under Act of March 3, 1879

The Novice Driver

THE season of the new driver is approaching. With the warm days of spring near at hand and dried-up roads, thousands of the cars which have been sold and delivered during the past winter months will be taken out for their trial spins. In many cases the drivers will be inexperienced, perhaps handling cars for the first time, and in not a few cases will they be entirely ignorant of the construction of the cars they operate, as well as the laws of the road they drive upon. Beginners should exercise that caution which characterizes the experienced driver, and in no cases take chances. To the beginner it may be well to explain that chances are described as driving at times when, if the unexpected should occur, an accident could not by any possibility be avoided. It is a fact that many of the accidents that will take place during the opening months of the season will be due to inexperience. A few general rules on the rights of the road will avoid many. Speed should always be reduced at street or road intersections, and in any place where an intersection is hidden by trees or other obstacles, the speed should be brought down to 8 miles per hour. In meeting a vehicle keep to the right, and in overtaking a car traveling in the same direction keep to the left. If signalled to stop by drivers of horse vehicles, stop, as it is a legal demand.

In city driving special care is needed in turning corners. Keep to the inside of the corner when turning right, and when turning left do not cut the corner, but make a wide turn around an imaginary point which marks the center of the intersection of the streets. Nonsensical blowing of the horn at street intersections invariably results in more or less confusion. When the horn is blown, it should be sounded well in advance, so as not to stampede the pedestrian, sounding the horn when nearly upon a pedestrian generally causes confusion, which may and in some cases has resulted fatally.

Federal Registration of Cars

FOR upwards of 2 years there has been before the federal government a bill introduced by Charles Thaddeus Terry, on behalf of the American Automobile Association, arranging for the federal registration of motor cars. The scope of this bill, in brief, is that a "motor vehicle bureau" will be established at Washington, D. C., and with which bureau owners of motor vehicles in any state in the Union may register their vehicle for a sum of $5, which registration will permit said owners to drive their car through any state in the Union without having to take out a license number in such states that at present call for registering cars of non-residents, this federal registration being in addition to the regular state registration of the owner. It must not be construed that because an owner under the conditions of the bill would be permitted to register his car in Washington that he would be excused from registering it in his home state; this is not the purport of the bill, but rather that he register as usual in his home state, carries his home state license tag, and in addition registers with the "motor vehicle bureau" at Washington and carries a special tag furnished by this bureau, which tag would give him the privilege of traveling in any state without molestation.

TO date there have been two hearings on this bill, the most recent one being in February, when a legislative convention was convened in Washington for the special purpose of arguing the merits of the bill. The matter is now under consideration by the house committee of interstate and foreign commerce, and it is expected that favorable action will be taken by this committee. During the Washington hearing many of the federal representatives spoke in favor of the bill on the ground that it points towards uniformity of state motor vehicle laws, which are at present in a most irreconcilable state. The necessity of uniform laws throughout the states has been referred to on several occasions in these columns. One of the first reasons is the necessity for uniform speed laws. In half a day's travel in many sections of the country a motorist will traverse portions of three states, and if he has to be conversant with three different speed limits the difficulty of such traveling becomes at once apparent. There is no reason why a speed limit which is applicable for rural sections in Illinois should not be applicable in Indiana, bordering on the east side of the state, and Wisconsin and Iowa on the west. The same applies to the speed limits which should control villages and towns and cities in adjoining states. Uniform state legislation is coming, it will not come at once, but will be taken up by groups of two or three states in one section of the country, which will form a nucleus around which others can congregate. In other sections similar nuclei will be started, so that it will not be long before instead of a separate state law for each state there will be but five or six different state laws throughout the country, and the question of a uniform law for all the states will then resolve itself into a satisfactory solution for six groups of states rather than trying to reconcile two score or more states to one way of thinking.

THE value of the federal registration bill points further than that of uniformity of state law; in fact, its most tangible phase is that it avoids the registration of non-residents in certain states in the union. As it is at present a resident of New York state must be registered in New Jersey and carry a New Jersey license tag before he can enter the state. This is a hardship, and particularly so to tourists, who are only passing through the state, or perhaps not traversing 100 miles of the New Jersey roads. At present there are not many states that compel non-residents to license their cars, and there should be fewer, as the inconveniences in the present states are amazing. If federal registration should accomplish nothing more than this it would perform a meritorious service, but its possibilities far exceed this limited scope.

THE greatest aid which motorists throughout the different portions of the country can give this bill at present is by communicating with the members of the committee before which it is up for consideration. Every motorist who has experienced the inconvenience of the present system should without hesitation take this matter up; and those who have not known from personal experience the troubles of non-residents' registrations should lend their undivided aid to the work.

HENRY FORD ANSWERS COLONEL CLIFTON

EDITOR'S NOTE—Henry Ford, president of the Ford Motor Co., has made the following reply to Charles Clifton, president of the A. L. A. M., on the Selden situation:

DETROIT, Mich., March 2—I have been notified in the press through the country that the A. L. A. M. is to wage war against what it sees fit to designate as "unrecognized" motor cars, to educate the public against buying them, and the stockholders of unlicensed companies against making them. At least this is what it would like the public to believe is its true motive, and it would be a most philanthropic undertaking, the like of which rarely is seen in commercial life. But the A. L. A. M. does the public a gross injustice to assume that it is so unintelligent as not to be able to see through the scheme. It should be, and no doubt is, so evident to the public that the real motive of this war of the A. L. A. M. against the unrecognized motor car is a selfish one, and is neither to protect innocent investors from putting their money into new enterprises nor to protect buyers from buying cars for which they will not be able to secure parts, but is for the purpose of maintaining their present extravagant prices.

Of course I can appreciate why President Clifton and his associates want to maintain the present high prices of their cars. If they can continue to reap large profits on their product they will do so even though it means stifling competition. That is the easiest way to maintain profit —much easier in fact than devising ways and means of reducing the costs. It never occurs to them to reduce the profit.

I do not understand all the motive of this licensed association in its campaign of educating the public to the point where it will recognize the advantages alleged by the association to accrue from purchasing its product, but it occurs to me that a much shorter way would be to go to the courts and have the unlicensed manufacturers enjoined from producing cars. That would beat trying to educate the public to refrain from buying these tabooed cars.

Mr. Clifton is entirely correct in saying that many promoters are pointing to the profits made by a few of the old-time manufacturers, thereby encouraging the formation of new companies and inducing innocent people to place their money in these said new companies on the alluring representation of profits made by the old companies. He is equally correct when he says there are a lot of these companies doomed to failure, but there are, too, a lot of the seventy-two varieties doomed to failure; in fact, in looking over the list of the seventy-two varieties I think I can safely predict that there will be more failures among these makers during the next 5 years than there will be among the so-called unrecognized motor car manufacturers.

There isn't a manufacturer among the makers of the seventy-two varieties that has the facilities such as the Ford Motor Co. possesses for supplying parts for its cars. This we can say without fear of successful contradiction. What assurance has the public that it can get parts for any of the cars made by the manufacturers of the seventy-two varieties—the association does not guarantee it, nobody guarantees it.

The licensed association does not grant to buyers of licensed cars any protection that is not granted to buyers of Ford cars. Time will prove whether or not the protection this association affords even nearly equals the protection a Ford buyer has. In spite of this intimidation campaign, no Ford buyer need fear an infringement suit. The Ford company will furnish a national surety bond indemnifying Ford buyers against suit. As the assets of the National Surety Co. of New York combined with the assets of the Ford Motor Co. total approximately $12,000,000 it is evident that a Ford buyer or present owner has every assurance of ample protection, viz, $12,000,000 worth.

I am willing to trust our case to the courts or to the public, and to leave it to them to decide whether the motives of the A. L. A. M. really are as it would have you believe. The public knows that all this campaign of education and all this expenditure of money for advertising is for the benefit of the seventy-two varieties, not for the benefit of the public, just as this same public knows that I am not building cars for the benefit of the public and that we are not conducting our campaign of publicity for the benefit of the public, but for the benefit of the Ford Motor Co. in so doing, however, we are proceeding along honest lines, a fact with which we believe the public does agree.

It should be evident to the members of the A. L. A. M. that the motor car industry must take its course with other industries, must allow the weeding-out of the unfit, and must permit of the continuance of the industry by those who are left with the survival of the fittest. This is exactly as in all other lines of trade. If manufacturers of these seventy-two varieties were willing to work along these lines, they would be spending their money, time and effort in educating the public, and they would be devising ways and means to be among the surviving. Instead they are trying to build up a monopoly by means of this so-called Selden patent,

a monopoly, which will eliminate their having to compete for a position.

It is said that everyone has his price, but I can assure you that while I am at the head of the Ford company, there will be no price that would induce me to permit my name to be added to those of the seventy-two varieties. I am going to continue our fight along the honest lines as always and to trust to our courts, in which I have the greatest confidence, to see that justice is done. Between courts it is not unusual to have a difference of opinion. The expectation of such a difference is evident in Judge Hough's opinion. He predicted that the matter will be taken to the court of appeals, to which court we will surely take it, and here is something more to consider. We expect in a little while to tell the public something else of real interest on the situation.—Henry Ford.

REEVES VISITS DETROIT

Detroit, Mich., Feb 28—A two-sided campaign of education relative to the Selden patents now is being carried on in this city, as a result of the visit here last week of Alfred Reeves, general manager of the Association of Licensed Automobile Manufacturers. Although it was announced that the sole purpose of Mr. Reeves' visit was to launch such a campaign in Detroit, as evidenced by the half-page advertisements that appeared in all the local papers shortly following his arrival, it generally is rumored that another object was to coax Henry Ford, head of the Ford Motor Co., to join the ranks of the licensed manufacturers. In this respect, however, if any such attempt was made, Mr. Reeves' mission was a failure, for the advertisements printed in the interest of the Selden patent have brought a stinging reply from Mr. Ford.

The fight is being watched with considerable interest in local car circles. Mr. Ford's stand is generally regarded as a challenge to the A. L. A. M. Mr. Reeves left Saturday night without having started any legal action looking to the protection of the Selden patent, though rumor has it that further litigation is probable.

Mr. Reeves stated, however, that the present campaign will be one of advertising rather than litigation, and the public is to be the court.

"Later we may find it necessary to start new cases against persistent manufacturers," he added, rather significantly. "As to Mr. Ford, there will be no cutthroat methods employed against him. He is recognized as one of the pioneers, and the association only desires that he join its ranks."

"The A. L. A. M. wants it understood that the keynote of its policy is the protection of the motor industry. It has reached a stage where precautionary measures are necessary."

MANY WESTERN DEALERS AT DENVER SHOW

GENERAL VIEW OF THE DENVER MOTOR CLUB'S SHOW, WHICH WAS HELD IN THE AUDITORIUM IN THAT CITY

DENVER, Colo., Feb. 26—The 4-day show of the Denver Motor Club, which opened Wednesday night in the Auditorium and which closed this evening, is declared to have been the most successful of its kind ever promoted in this territory, not alone from a decorative point of view but also from a dealer's standpoint. Not only were many retail sales made, but the show attracted dealers from a large territory, the statistics of the show proving that there were about 250 out-of-town dealers present, while 600 of the special rate railroad tickets were validated. A conservative estimate of the business during the 4 days places the total of cars sold to agents in this territory at 2,400 machines, while it is evident that the retailers of Denver expect to sell 1,000 additional cars in this city. As the cars stood on the floor it is estimated that their list value totaled $200,000, while in addition to this the remaining exhibits of motor cycles and accessories easily reached $50,000.

The territory covered by the show covered Colorado, Wyoming, New Mexico, Arizona, Utah, Idaho and Nebraska, and in this stretch of territory fifty-three agencies were placed during the show, as follows: E. R. Cumber, five in Colorado and Wyoming; Michaels & Middlekauff, three in Colorado and Wyoming; Mathewson Auto Co., seven in Colorado and Wyoming; E. W. Swanbrough, four in Colorado and Wyoming; F. A. Trinkle, three in Colorado, Wyoming and New Mexico; Overland Auto Co., one in Utah; Ford Motor Co., twelve in Colorado, Wyoming, New Mexico, Utah and Idaho; Johnston Motor Sales Co., ten in Colorado, Wyoming, Idaho, New Mexico and Utah; Welch Motor Car Co., one in Colorado; Havens Motor Car Co., six in Colorado, Wyoming, New Mexico; A. T. Wilson, one in Nebraska.

The eastern factory representatives who attended the exhibition were George W. Cox and J. R. Wilkins, of T. B. Jeffery & Co.; J. W. Gilson and J. M. Cramm, of the Mitchell-Lewis Motor Co.; A. Schnell, of the Black Mfg. Co.; L. Bogue, of the Kissell Motor Car Co.; W. Parce Rayner, of the Kelly Motor Truck Co.; R. H. Rumble, of the Dorris Motor Car Co.; C. B. Irwin, of the Renault company; R. C. Rueschaw, of the Reo factory; Steven Born, of E. R. Thomas company; George H. Strout, from the Apperson plant, and John Jack, from the Winton Motor Carriage Co.; Ed Politz, of the Haynes Automobile Co.; Paul Smith, from the E-M-F company; E. W. Allen, of the Detroit electric plant; Charles Burman, of the Peerless company, and Martin Fetcher, from the Premier factory at Indianapolis.

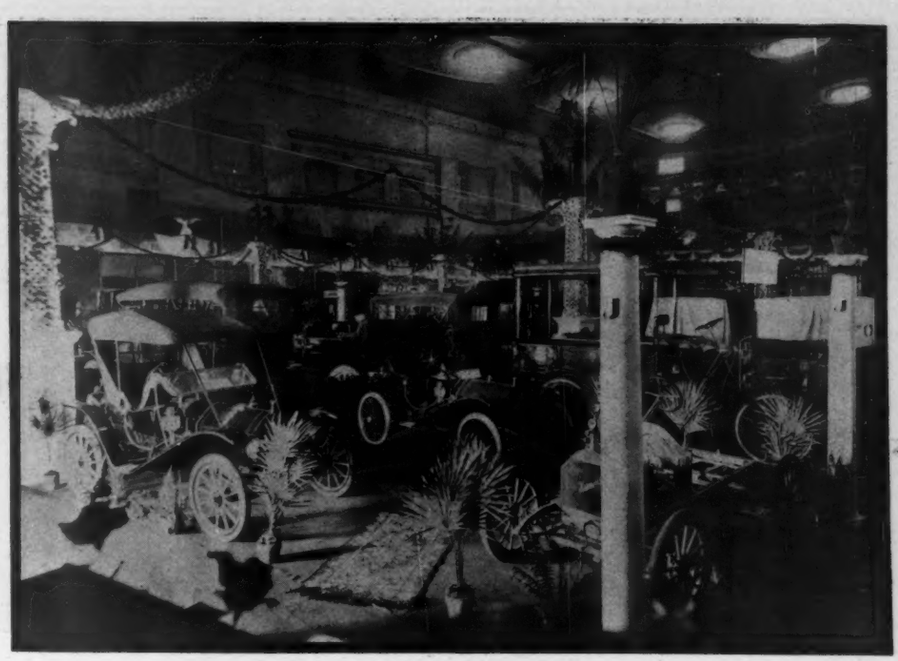
A total of 18,230 square feet of floor space was sold. The Auditorium, in which the show was held, is the largest building in the west, but it was found necessary to place some of the smaller exhibits in the large corridors on account of lack of space on the main floor. The building was

HAWAIIANS ATTRACT CROWDS AT MITCHELL AND RAMBLER BOOTH IN DENVER

beautifully decorated, the general color scheme being worked out in white and green. The faces of the balconies were decorated with white and green bunting and corresponding shields and at intervals of 20 feet were large plaster of paris casts of eagles perched on a triangle of motor car wheels. The faces of the galleries were decorated with American flags and shields. The entire floor was covered with a green carpet and white canvas strips laid down the aisles. Midway between the center and side aisles and the full length of the building were large latticed columns entwined with green climbing plants and on top of which were large palms. At the corners of each exhibit were smaller round pillars, on top of which were placed palms also. Running from side to side of the building at intervals of 20 feet were strings of red and blue electric lights. This brought out the Denver Motor Club colors, and enormous club pennants were also hung from the sides of the building.

The individual exhibits were very elaborately decorated with artificial and fresh-cut flowers. There were many electrical decorations and effects used by the exhibitors who occupied the smaller spaces around the sides of the building. While there were a great many cars in proportion to the amount of floor space available, still the show did not present a crowded appearance. This was due to the care and judgment which the exhibitors exercised at the request of the club.

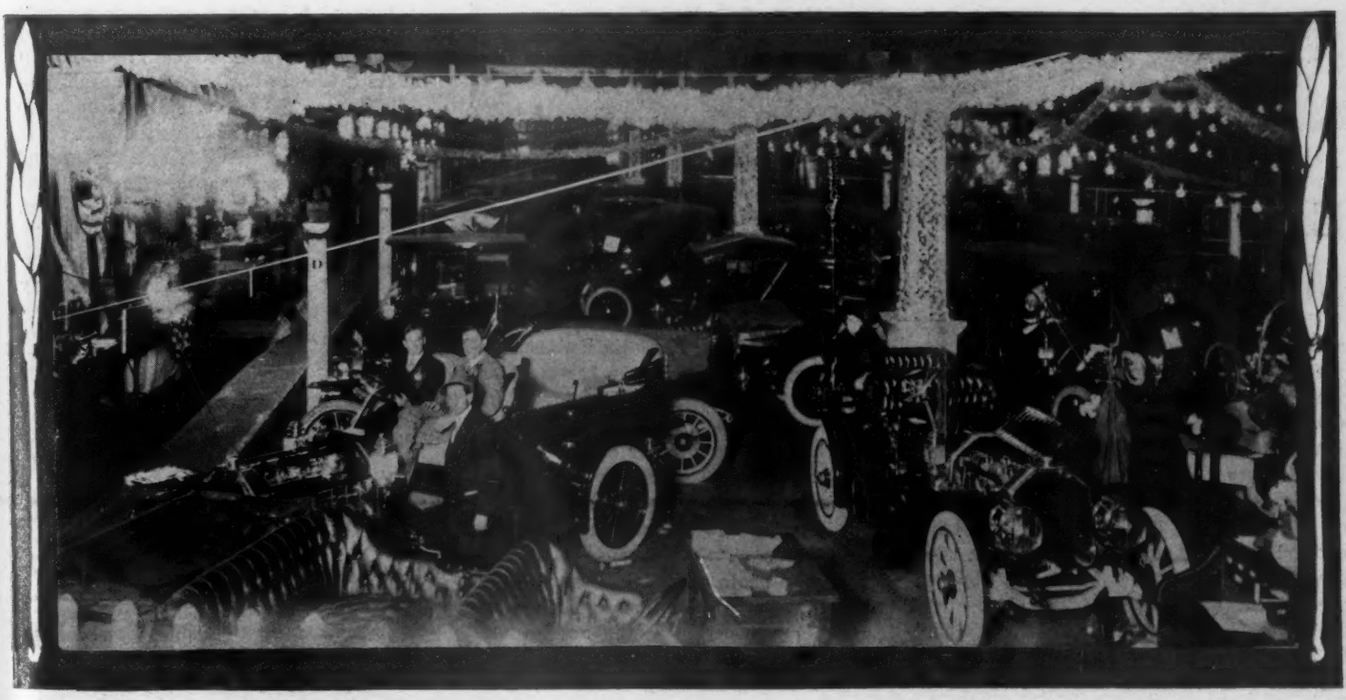
Every possible convenience was provided for the visitors. Women's and gentlemen's' retiring rooms, which were completely furnished, were in all four corners of the building. Telephone booths and extensions were installed, a branch telegraph office was available and an information bureau, which was also used as the Denver Motor Club office, was found just inside the main entrance to the building. An excellent musical program was arranged for each afternoon and evening of the 4 days. The attendance averaged about 12,000 people each day.



DENVER'S BIG SHOW—ONE CORNER OF THE AUDITORIUM

NOVEL SHOW ON COAST

Los Angeles, Cal., Feb. 20—Considered from any standpoint there is no reason why the Los Angeles show of licensed cars, which opened last night at Fiesta park, should not be regarded as one of the big motor displays of the winter. Certainly from a standpoint of beauty, size and scenic effects the country never has seen anything to surpass the grouping of over 150 1910 motor cars in the immense redwood forest. The entrance to the show is up a long runway, backed and roofed with foliage, giving the effect of an immense arbor. On entering the big hall a magnificent view spreads out before the visitor. There are redwood trees in all directions and above, twinkling like thousands of brilliant stars, are 10,000 incandescent lights. The green carpet resembles nothing so much as a beautifully kept lawn. The painted scenery which constitutes the four walls create the effect of distant forests and valleys.



DENVER MOTOR CLUB'S SHOW, GIVING AN IDEA OF THE TASTEFUL DECORATIONS

LICENSED DEALERS' SHOW IN LOS ANGELES, GIVING EFFECT OF A REDWOOD FOREST

AT OMAHA—GENERAL VIEW OF INTERIOR OF SHOW BUILDING

Exhibitors Praise Minneapolis Show

MINNEAPOLIS, Minn., Feb. 28.—The Minneapolis show closed Saturday with a record number of sales made by each exhibitor. That interest did not lag on the closing day was manifested by the fact that visitors thronged the building from early in the afternoon until late at night. Among them was Governor Eberhart, whose interest was aroused by several of the show models. At night he met Hugh Chalmers, of the Chalmers company, and the two entered upon earnest motor car talk for several minutes. A fact which contributed greatly to the success of the show was the presence of hundreds of dealers from all over the northwest, many of these having this year by their coming recognized that the Minneapolis display was of such character as to pin their faith and business to it.

Nothing could be more gratifying to the members of the show association than the praise accorded them by the basement exhibitors. These exhibitors, representing several companies manufacturing commercial vehicles, sent a letter to the association thanking the management for its treatment of them and endorsing the exhibit itself in the highest praise. Complete returns on the volume of business done at the show have not been received, but stray reports show that exhibitors are immensely pleased over the results and one and all predict the northwest is on the eve of a record-breaking motor car business for the season of 1910.

Kansas City's Show Proves

KANSAS CITY, Mo., March 1—An extraordinarily complete and attractive motor exposition for a dealers' entertainment—Kansas City's fourth annual—opened in Convention hall last night and the vast tree-dense Auditorium has been thronged with visitors since, a big fraction of the crowd coming from out of town. Charles T. Jeffery, general manager of Thomas B. Jeffery & Co., makers of the Rambler, a visitor at the show today, can best be relied upon as a critical judge of it.

"For beauty it's fully as satisfactory as the Chicago show, though not so lavish," Mr. Jeffrey said. "In extent it's surprising. I couldn't find a single foot of all the exhibit space vacant."

The show is by far the greatest that Kansas City ever has enjoyed—not only in exhibits, for Convention hall has been expanded to an unprecedented size by the construction of a pavilion entirely around the arena—but in beauty. The hall has been wondrously shifted into a magic park of trees—flowery, pink trees connected by strands of leaf-shaded electric bulbs. Overhead stars twinkle and wink just the way they did in the Chicago show and as they do in the heavens every night. The jagged outlines of foliage runs around the pavilion. In the grand stand in the south pavilion Hiner's Third Regiment band plays afternoons and evenings for all the world, in the minds of Kansas City folk, like concerts in Penn Valley park during the summer time. And the most faultless, most delightful early spring weather certainly enhances the out-of-doors effect de-

GENERAL VIEW OF THE LOS ANGELES SHOW, SECOND ONE HELD THERE THIS WINTER

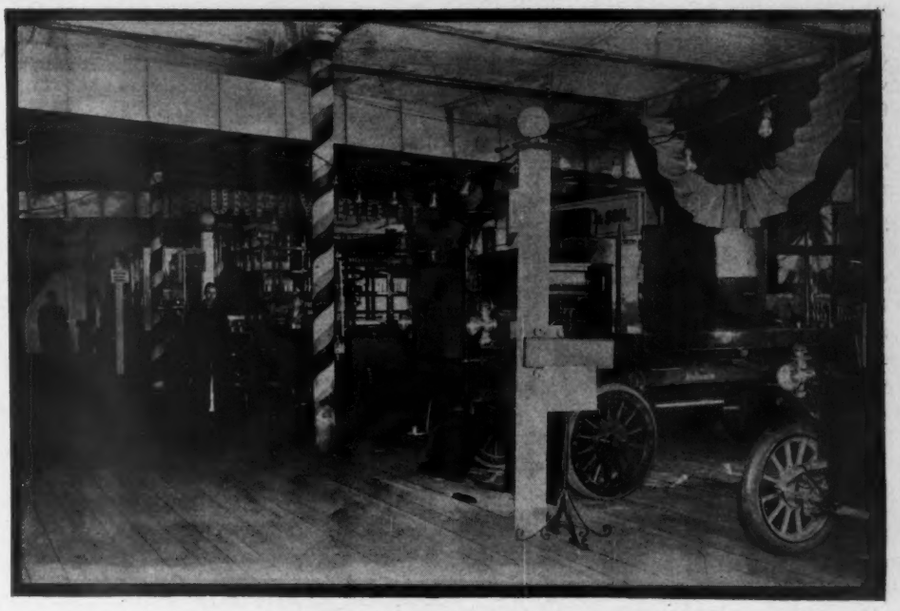
One of Startling Beauty

sired by the decoration committee of the Kansas City Automobile Dealers' Association that is giving the show. A. O. Brooke, chairman of this decoration committee, is one of the proudest men in Kansas City today for the general enthusiastic praise that has been accorded the show.

In preparation since last November, the show represents the efforts of a show committee of twenty-four members of the association, headed by J. H. Hollister. The big committee was divided up in eight subcommittees, as follows: Advertising, Nicholas Hall, Louis J. Long and C. C. Lake; car exhibits, H. M. Genung, J. H. Griffith and W. T. Brendt; auditing, H. G. Kirkland, F. C. Caldwell and W. E. Mallory; decoration, A. O. Brooke, B. L. Colaw and L. C. Shellaberger; accessories, H. F. Gleason, L. W. Lease and E. H. Farnsley; entertainment, Roy Kendall, Lisle Alderson and C. W. Woodward; admissions, D. S. Dider, J. H. Shellaberger and J. H. Shepherd; trucks and motor cycles, E. B. Saufley, E. M. Hollister and A. L. Bennett.

The officers of the association are: George A. Bond, president; J. R. Histed, vice-president; J. R. Nave, secretary, and H. G. Kirkland, treasurer, and W. E. Mallory, Carl Simon and C. A. Post, directors. A. M. Blake is secretary of the show committee of the association.

But in addition to the congratulation that has come to members of the association for the highly successful show, there has been an early attendance of buyers. Nearly all of the dealers report big first of the week sales.



AT OMAHA—COMMERCIAL CAR EXHIBIT IN THE BASEMENT

Big Gate at the Baltimore Show

BALTIMORE, Md., Feb. 26—Tonight the curtain was rung down on the most successful motor car show ever held in Baltimore. That this condition prevailed was due to the thorough co-operation of the dealers and members of the Automobile Club of Maryland, under whose auspices the exhibition was given this year for the second year at the spacious Fifth Regiment armory. The total attendance was a record-breaker from a Baltimore standpoint, being something like 40,000 paid admissions. It is estimated that the sales made during the week would figure up over the $200,000 mark. Another particular feature of the show just closed was that more visiting motor car dealers and representatives were in the city that at any other time in the history of Baltimore. One of the things that these men were unanimous on was that the Fifth Regiment armory stands out pre-eminently as one of the most suitable buildings in the country for just such exhibitions. There is a well-founded rumor that the Baltimore dealers are unanimous for the organization of a dealers' association on the most progressive scale and the realization of this desire seems to be only a matter of a very short time. In the event of such an association being formed it is the consensus of opinion that next year Baltimore will be the center of two shows, one of which would be under the auspices of the dealers while the other would be a club affair. As a grand wind-up of the show a banquet of the exhibitors,

COMPREHENSIVE VIEW OF BALTIMORE SHOW, WHICH PROVED TO BE A BIG SUCCESS

which was gotten up by Harry Mayer, who is connected with the Auto Supply Co., was held at the Hotel Lexington. The success of the show was the keynote of the various speeches. All the exhibitors except two were represented. Thomas B. Hutchison, the assistant secretary of the Automobile Club of Maryland, acted as toastmaster of the banquet.

SIOUX CITY HOLDS SHOW

Sioux City, Ia., March 1—The show which opened here this evening and which lasts until Saturday night is being promoted by the Sioux City Automobile Trade Association and the Sioux City Automobile Club. Among the cars that are being exhibited are the Cartercar, Lambert, Buick, Velie, White, Jackson, Fuller, Maxwell, Reo, Haynes, Thomas, International, E-M-F, Mitchell, Apperson, Studebaker, Firestone-Columbus, Overland, Ford, Rambler, Waverley, Chalmers, Hudson, Cadillac, Oldsmobile and Stevens-Duryea. The promoters were obliged to turn down several applications because of lack of space. The officers of the trade association are: President, H. B. Groves; vice-president, George B. Cord; secretary, L. C. Lessenich; treasurer, F. A. Reed. The officers of the Sioux City Automobile Club are: President, Dr. F. A. Seeman; vice-president, L. H. Jones; secretary, W. S. White; treasurer, W. A. Kifer.

FARMERS BUY AT OMAHA

Omaha, Neb., Feb. 28—The fifth annual show of the Omaha Automobile Association which closed Saturday proved to be the biggest thing of its kind held in this city. More than 25,000 people attended the show and the dealers declare that the results were beyond expectations. A feature was the large number of farmers who came in to the show. Quite noteworthy was the fact that the fellows who now are selling $10 hogs not only came to see the show but they had the money to buy and they bought. Such a run of orders was said to have been taken before by no other motor show west of the Mississippi river. One exhibitor said his business had been better than at the Chicago show.

The general trend of the business in the west is indicated by the fact that the demand was for substantial rather than for fancy cars. Seventy-five varieties of machines were on display. The display was limited, however, by the size of the Auditorium, which, although a block long, was sadly inadequate. Had it been twice as large it could not have accommodated all who wished to exhibit. As a result nearly as many dealers, outside of the show as in, had exhibits in buildings ranging a distance of one to three blocks of the Auditorium. Several representatives of large eastern factories, at present without dealers in Omaha, stated at the close of the show that they had decided to enter the field here.

BOSTON READY FOR SHOW

Boston, Mass., Feb. 26—Manager Chester I. Campbell has worked out all the details for the Boston show, which opens next Saturday night at Mechanic's building. Additional space has been squeezed out of the building, so that now it will be nearer 110,000 square feet than the old figure, 5,000 feet less. The building will be turned over to the show people on Tuesday and immediately a big force of men will be put to work on the preliminary details of measuring off the spaces. The decorators will get busy on Wednesday and it is expected that by Friday morning their work will have progressed far enough to allow the cars to be sent in. The total number of cars that will be placed in the building will be between 400 and 500. There will be more than 100 different makes represented, all but about a dozen of which will be pleasure cars. The commercial feature will be on a larger scale than ever this year, and the same will be true of the motor cycles. The proposed run from New York to Boston on the opening day of the show has been postponed. Whether it will be held during show week is problematical, but the chances are now that it will be run later in connection with some other event in Boston.

PITTSBURG PREPARES SURPRISE

Pittsburg, Pa., Feb. 28—The fourth annual show which will open in Duquesne garden Saturday night, March 26, is going to be an event of unusual attractiveness. The show committee has arranged to hang a monster Easter egg in mid-air in the great auditorium opening night and at an electric signal Mayor William A. Magee will pull a magic string that will open the egg and discharge upon the crowds below a vast number of Easter blossoms. This is only one of the features which are going to make the 1910 show far ahead of any similar preceding event. There will be eight immense Gothic chandeliers valued at $500. The decorations will cost at least $5,000. Hanging baskets of flowers are being designed and will add much to the beauty of the event. F. B. Saupp is chairman of the show committee.

MILWAUKEE SHOW REPORT

Milwaukee, Wis., March 1—It is conservatively estimated that nearly 100 cars were sold during show week in Milwaukee, to the aggregate value of $215,000. The Auditorium show's total attendance was 33,500, or about 20 per cent larger than at the Hippodrome show in March, 1909. Of the profit, the exhibitors will receive 35 per cent, or 10 per cent more than in 1909. The net profit of the club will probably amount to $3,000, which will be devoted to the building fund. It insures an early beginning of work on the proposed clubhouse west of the city, on Blue Mound and Cottrell avenues. So successful was

the Auditorium show, despite the handicap of being opposed by an organization of fourteen dealers, that plans are already being made for the 1911 show. The Auditorium board has already set aside an entire week in February, 1911, for the show against any other possible engagements. While officials of the club are frank to admit that the opposition of the independents caused a drop in attendance from the anticipated figures, the general feeling is that the next show will see all dealers in the ranks.

SHOW TO BE EDUCATIONAL

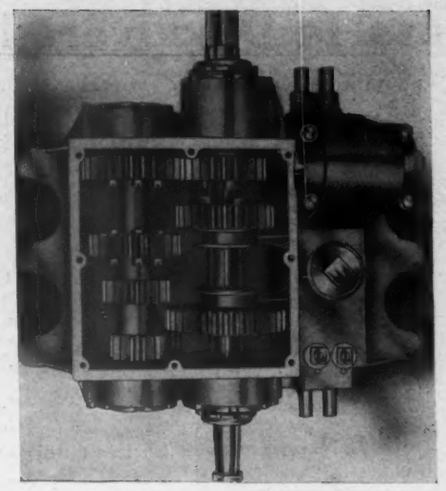
Syracuse, N. Y., Feb. 26—Elaborate preparations are under way by the Syracuse Automobile Dealers' Association for the second annual show to be held in the New York State armory from March 15 to 19. So far as possible it is the intention to make the show an educational affair. Engines in operation, revolving chassis and practical demonstrations will be prominent in every exhibit and expert operators will be engaged to give 5-minute lectures on the evolution of the industry.

LOUISIANA STARTS CAMPAIGN

New Orleans, La., Feb 26—Chef Menteur, wilderness and hunting and fishing paradise, will be opened up to motorists by the new shell road, work on which was begun February 14 by a gang of twenty-five convicts. This is the first tangible evidence of the value of the Motor League of Louisiana, which has been organized about 1 year, and which has devoted all its energies to securing the construction of this road. In the organization there are 200 members, whose dues are $12 per year. The city has budgeted $2,000 toward the road, so that at least $4,400 is in sight for the improvement. The state is furnishing the labor free, for Governor J. Y. Sanders has appropriated the good roads slogan, originated by New Orleans motorists, as his own.

New Orleans is peculiarly situated. It is one of the few cities of the world surrounded by almost primeval forests and swamps. The entire limits of the parish of Orleans form its corporate limits, so the new shell road is technically a city improvement. Chef Menteur, 18 miles from the business district, is a hunting and fishing resort which gets its name from the long channel which connects lakes Pontchartrain and Borgne, the latter being really an arm of the gulf. "Boss Liar" is the literal translation of the name, which was conferred upon the channel by French explorers. The channel is lined with fishing and hunting camps and clubs, but the section never has been overrun because at present it is inaccessible, except by the Louisville and Nashville railroad, and there is no public acoemmodations.

The motor car owner in New Orleans has to content himself at present with running about the city proper, as there are few good roads leading out. Touring, or road racing, is practically impossible. Last year there was a road race to Jeanerette, La., but conditions were so bad that it is not likely another will be attempted soon. The good roads movement therefore was instituted by the motorists just, as they have fathered the movement in many other states. The interest they have awakened in the case has become general, and Governor Sanders recently called a good roads convention in Baton Rouge, its first aim being the establishment of a model highway between New Orleans and the capital.



GEARSET OF SPOERER, MADE IN BALTIMORE

NUCKOLS COLUMBIA CHIEF?

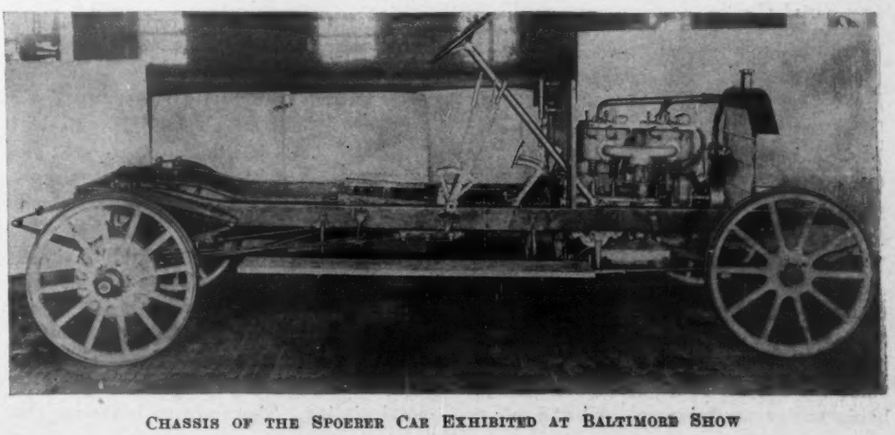
Hartford, Conn., March 2—Special telegram—Is H. W. Nuckols to become president of the Columbia Motor Car Co. of this city? Such a rumor is going about quietly this morning. Following in the wake of the meeting of the new $16,000,000 holding corporation in New York city Tuesday, it is stated that the three men elected vice-presidents in the holding corporation are to be presidents of the respective companies which they represent and which are affiliated with the holding corporation. Herbert Lloyd of Philadelphia is the present chief executive of the Columbia Motor Car Co. and under the new situation he will become president of the local factory, of which he is vice-president and general manager. Another new concern, the name of which is not disclosed here but which is represented by Mr. De Lisser, is to join the holding corporation shortly. It is regarded as quite certain that Mr. Nuckols will become chief executive o fthe Columbia company.

GRAMM BUYS LIMA PLANT

Bowling Green, O., Feb. 26—The Gramm Motor Car Co. has found it necessary to enlarge its plant, and with that idea in mind has closed a contract with capitalists at Lima, O., by which it secures 22 acres of land in that city. The new factory, which will cost about $5,000, is to be erected on land adjoining the locomotive plant and 800 men will be employed when it is finished, the estimated output being about 1,500 cars a year. The plant in this city will continue to be operated.

PORTLAND IMPROVES BOULEVARDS

Portland, Ore., Feb. 26—Portland is making great strides in its boulevard system and is following the plan used in some of the eastern cities of building a long stretch of hard-surface pavement, entirely circling the city and taking in all the beauty spots and parks of the city. When completed the Portland boulevard system will offer the most beautiful drive imaginable. Starting from the center of the city, thence through South Portland and along the water front past Fulton park, and then on to Riverview cemetery, the motorist soon will find himself at the Willamette river. Then down the east side, the boulevard will skirt the high bluff overlooking the river and past the Sellwood and Midway districts into Brooklyn. Turning east here through Ladd's field the roadway leads to Mount Tabor, the reservoirs and the new city park. After rounding the park the road leads one toward the country club and Columbia boulevard, down through Overlook addition and back along Willamette boulevard to Willamette Heights and the residence section, through Macleay park and to Council Crest, along the hills back of the city where the traveler may pick out Mount Hood, Mount Adams, Mount St. Helens and on a clear day Mount Tacoma, the highest peak of them all and a most beautiful sight.



CHASSIS OF THE SPOERER CAR EXHIBITED AT BALTIMORE SHOW

New Plating Process Is Discovered

LONDON, Feb. 9—Augustus Rosenberg, an English scientist, has discovered a method of plating metal objects with other metals, such as gold, silver, nickel, cadmium, zinc, etc., which entirely supersedes the hitherto universal electro-depositing process. Cheapness, simplicity, ease of working, freedom from extensive apparatus and the lack of necessity for the employment of skilled labor, as well as numerous other advantages which will appear later, are some of the points of the new process.

What the invention means for the motor industry can scarcely yet be grasped, but it is certain that its effects must be extremely far-reaching and that in a short time it will take the place of all other processes. By its aid the motor manufacturer in the humblest way of business will be able to do all his own plating at a fraction of the cost which he has to pay at present. In fact, so cheap and simple is the Rosenberg method that it is safe to prophesy that in the near future motor makers will plate all the parts of the car that are not usually painted so as to free them from the likelihood of rusting, and no one can deny the advantages of an unrustable motor and transmission gear. The radiator, lamp or other fitting which hard usage has dulled, can be replated in situ by the man who looks after the car, for the process is no more elaborate and requires no more skill than the present one of rubbing up the bright parts with a metal polish.

The disadvantages of the present electro-plating system are manifest. There is great difficulty in making the metal object to be coated sufficiently clean to admit the depositing upon it of another metal, at the same time a considerable plant is required, with the use of poisonous cyanide solutions, hot baths, etc., and at the same time requiring the employment of highly skilled labor to avoid failure. Thus, in the case of iron and steel, it is extremely difficult to prevent rust forming upon the surface of these metals under the plating, this rust causing the film of deposited metal to peel off in flakes. Furthermore, in the process of nickel-plating on any metal if there be the slightest suspicion of grease upon the object to be plated, such as, for instance, a finger mark, this will form a blemish on the finished surface which cannot be eradicated. Certain metal, too, cannot be plated in one operation by the electro process, iron, steel and aluminum requiring first a deposit of copper, upon which the plating metal is afterward applied.

The new method consists in the application to the object to be plated of a mixture of certain powdered materials, the precise proportions of which have been made the subject of a patent, the mixture being known as Galvanit. All one has to do with this remarkable compound is to place a little on the article to be plated and rub it on with a moistened rag or brush, no dipping in alkaline solutions or pickling in strong acids being required, provided the object has been made reasonably clean. Rust, of course, must be removed from the surfaces of iron and steel, but in the case of brass, aluminum, copper, etc., the tarnish which forms if these metals be not continually kept clean need not be removed, the rubbing into them of the Galvanit powder automatically cleans them.

The Galvanit process is no less an electro-chemical one than the method at present universally in use, the great difference between the two being that in the former case the action is a purely local one. The powder consists, first, of an electro-positive metal, such as magnesium or zinc; secondly, the metal to be deposited in its elementary state, and also finely divided; and thirdly, a salt, preferably a salt of ammonia. If either magnesium or zinc be used for the electro-positive ingredient of the mixture, the electrolytic action is too rapid, and it has therefore been found necessary to add a neutral and inert ingredient so as to prevent the deposition of the electro-positive metal from being uneven. The composition of the Galvanit powder for plating with zinc is as follows:

Zinc	15	parts by weight
Magnesium	1	part by weight
Soapstone	2.5	parts by weight
Chalk	10	parts by weight
Ammonium sulphate	5	parts by weight

If plating of some other metal, gold, silver, cadmium, etc., be desired, that metal simply takes the place of the zinc in the above composition, a proportional quantity being substituted.

When water is added to the mixture the sulphate of ammonia becomes an electrolyte and the process of deposition depends upon the action which then takes place between the electro-positive ingredient and this electrolyte, which consists of a metallic salt in solution. The electro-positive metal thus becomes an anode, while the metal object to which the deposit is being applied becomes a cathode and thus receives the molecules of electro-positive metal, which pass over through the electrolyte, the finely divided positive metal making innumerable contacts with the cathode and accordingly acting as a tremendous number of anodes. In this way an electric current is locally generated and the result is that a deposit of electro-positive metal is thrown down on the surface on which the powder is rubbed.

The process, which is so absurdly simple that it is scarcely credible that no one thought of it before, is capable of being successfully used by a child, neither scientific knowledge nor special training being required for the obtaining of a deposit of metal plating. There are no baths for the article to be plated to be dipped in, no cyanide mercury or, in fact, any injurious ingredients whatever. There is neither acid to spoil one's clothes nor chemical to stain one's fingers. The process is extremely quick in operation and a thick, homogeneous and bright deposit is rapidly produced. The articles to be coated require no chemical cleaning and, most important of all, the process is extremely cheap, the Galvanit powder being put up for sale in shilling tins.

A full demonstration of the working of this process was given yesterday before the Royal Society of Arts, articles being plated in a few minutes and afterward being submitted to vigorous examination and tests at the hands of leading scientists. The president of the society, Professor Sylvanus Thompson, of London university, announced that although he had, up to the time of his personally testing the working of the invention regarded the depositing of such metal as gold, silver and zinc by such a process as impractical, and in the case of nickel impossible, he was perfectly satisfied by the results of his very careful experiments that the Galvanit process was entirely practical.

STILL BARS MOTOR CARS

Washington, D. C., Feb. 27—Answering numerous petitions requesting the admission of motor cars into the Yellowstone national park, the secretary of the interior, under whose department control over the park is vested, has replied that it is not feasible to permit motor cars in the park, "because of the danger involved to the beauty of the park and the safety of patrons." "The game in the park," said Secretary Ballinger, "has now become accustomed to the stages which traverse its paths, and the entrance of a new motive power would naturally frighten them. The stage horses, unused to the sight of a motor car, would likewise be seized with fear and endanger the lives of passengers." It is not believed that motor cars will be admitted to Yellowstone park until a separate roadway is built for them.

CHICAGO WANTS LOWER TAX

Chicago, Feb. 26—The first official step to bring about a revision of the local wheel tax was taken yesterday when 150 motorists appeared before the license committee of the council and presented their claims to the aldermen. They argued for a change in the method of taxation, desiring that the fees be collected according to horsepower instead of seating capacity. They succeeded in convincing the subcommittee on this point, and this was recommended at a later meeting of the license committee. However, no final action was taken in the matter because of the inability of the license committee to arrive at a decision on the rates to be applied under the new system. The Chicago Motor Club, which is carrying on the cam-

paign, desires a lowering of rates, suggesting $6 per year for cars 25 horsepower and under, $8 from 25 to 40 and $10 from 40 and upward. The aldermen gave the motorists 3 hours of their time and seemed to be greatly interested in the arguments presented to them, but after hearing these statements they referred the entire matter back to the sub-committee with instructions to furnish more facts by which the rates could be made. The attendance at this meeting was the largest representation of motorists that ever turned out for any reform movement in Chicago.

BAY STATE LEGAL ANGLES

Boston, Mass., Feb. 28—The first hearings on motor legislation by the Massachusetts legislature are set down for Wednesday and Friday mornings of the present week and Monday of next week. On the first morning all the bills relative to vehicles carrying lights at night will be heard. There are half a dozen of them. On Friday the hearings will be devoted to bills allowing men to use dealer's certificates until their cars are registered; another that all companies operating buses shall file bonds of $5,000 for each passenger the vehicle can carry to cover any injuries that may be sustained by those riding in them; a third that deals with noises made by motor cars and the last one asking that the law may be amended by changing the penalty clause from "shall" to "may." This latter is very important, because under the new law the judges have no alternative but to impose the fines and imprisonment called for in case of conviction and it is sought to change it, allowing the judges to use their discretion.

LICENSING MADE EASY

Washington, D. C., Feb. 27—In future it will be easier to obtain a permit to operate a motor car in this city, as the district commissioners have amended the police regulations to that end. Under the amended regulation applicants may receive their license by answering several questions put to them by the permit clerk of the motor car board, instead of being required to undergo an examination before the board. Under the old system any person wishing to obtain a permit to operate a motor vehicle was required to wait several weeks in some instances.

RELIEVING TAX BURDENS

Columbus, O., Feb. 28—To take away a portion of the burden of paying the cost of country road improvement and repairs from property owners within the 1 and 2-mile limits and to divide the expense among the county, township and property owners, Senator Gotshall has introduced a bill in the Ohio general assembly which provides that from 35 to 50 per cent of the cost shall be paid by the county, from 25 to 40 per cent by the township and from 20 to 35 per cent by land owners.

Show War Now Raging in Paris

PARIS, Feb. 14—War to the death has been declared between the Automobile Club of France and the leading constructors of the country. Each party wishes to have control of the next salon, neither will give way, with the result that two shows will be held and each party will do its best to kill the one organized by its rival.

On the one hand is the syndicate of car manufacturers, newly formed with about 75 per cent of the leading firms of France, which has signed a contract with the Aeronautical Manufacturers' Syndicate to join in a combined aeronautical and motor salon in the Grand Palais from October 15 to November 2. It will be a uniform decoration show, elegant but without any costly trimmings, with the profits shared by the men taking part in the exhibition. There will be no patronage from either aero club or motor club, and no funds to hand over to outside bodies.

The Automobile Club of France, having been deserted by one of the most important of the trade associations which in previous years has helped it to hold the show, and having lost the support of more than half the members of another and similar body, has declared defiantly that it will go ahead with the exhibition whether or no it may only have the support of a handful of manufacturers, with a trailing of cycle makers and accessory men, but after 11 years at the head of the industry it will not step down at the bidding of any manufacturers' association, however important it may be. Thus it announces the twelfth annual salon in the Grand Palais for the month of December, and has appointed Gustave Gobron, senator, and head of the firm of Gobron-Brillie, to be the general manager. The only important firms still standing true to the club are de Dion-Bouton Co., Mors and Gobron-Brillie. The cycle manufacturers prefer the club to the big constructors, and the accessory men have no objection to exhibiting their wares under both flags.

The Napoleon of the club forces is the Marquis de Dion, head of the de Dion-Bouton company, president of one of the decimated manufacturers' associations and vice-president of the Automobile Club of France. Unable to bring his colleagues to throw in their lot with the official salon, he has set out to slay them. His first real attack is in the form of a letter to Minister of Commerce Dupuy, in which he questions the right of the Aeronautical Syndicate to use a government hall loaned for an aero show for a motor car exhibition as well; he declares that the manufacturers are threatening to boycott any firm exhibiting at a rival show; and that they are a menace to the small constructors, accessory makers, body makers and agents. In view of this the government should refuse to allow them to use the Grand Palais.

It is difficult to understand how the government will find grounds for interfering, for admitting that all the charges are true—and this would not be a difficult matter—it does not follow that they are not legitimate commercial fighting methods. It is not the first time an order has gone forth that the exhibitors at the Paris salon should not take part in any other exhibition in the neighborhood, and on looking the matter up it doubtless will be discovered that this was a strong point in the club's regulations during previous years. The new syndicate doubtless is formed for the express purpose of advancing the views of its members; but few manufacturers' associations are got together for philanthropic purposes.

According to present indications the club cause is lost, despite the vigorous fighting of the Marquis de Dion. His opponents represent not less than 75 per cent of the French industry, they have the use of the Grand Palais by reason of their contract with the Aero Manufacturers, and they certainly will carry along with them all the dealers, accessory men and outside traders. Their only disadvantage is that the show will have to be held at an early date and that even the Grand Palais will not provide all the desirable space for a joint exhibition of aeroplanes and motor cars. The club, on the other hand, will have to board up a large number of corners in the Grand Palais to prevent their exhibits having a lost air.

NOW CASTLE LAMP CO.

Toledo, O., Feb. 26—Toledo has secured another industry which will furnish employment to at least 500 men. Announcement of this fact was this week made by F. E. Castle, of the Atwood-Castle Co., of Amesbury, Mass., with headquarters in Detroit. The company has been reorganized and its capital stock increased from $100,000 to $300,000 and will remove its plant to this city as soon as a location can be found and factory buildings erected. The concern has orders amounting to about $400,000 on hand and as these orders must be filled as soon as possible the Amesbury plant will be kept in operation until the Toledo factory has caught up with orders. The new concern will be called the Castle Lamp Co., and will manufacture motor car lamps as well as all kinds of commercial vehicle and boat lamps. The presence of the Willys-Overland Co. in Toledo is responsible for the fact that this city is selected as the site for the industry, President J. N. Willys, of the Overland company, being a stockholder in the new concern. The plant comes to Toledo with its capital stock all paid in and without asking for a bonus or other concessions. It is said that much of its product will be taken by the Overland company. F. E. Castle will be president.

Recognition for the Belgian Cars

BRUSSELS, Feb. 15—Both in France and in Germany technical writers have come to the conclusion that the enemy of their respective countries is Belgium. Not that they fear the army of this little but rich land, but they do fear the motor cars made by its dozen or so manufacturers. These critics do not hesitate to say that if Belgium were the size of France or Germany and had as many car makers in proportion and if they were building as well as they do now that the Belgian cars would be world-leaders.

No Belgian doubts this, for the car makers in this country really are making fine machines, and some of them are building cars which, although not known the world over like some of the French and German cars, are considered by experts to be fully as good or the equal and in some respects even better than those old or rather better-known European cars. This does not apply to all Belgian makes, as there are cheaply-made cars here as in most all other countries, but they are in much smaller number than in the neighboring countries.

Points of Superiority

What seems to have made the greatest impression upon foreign car critics is that in general the Belgian motors are more powerful than French or German engines of similar dimensions; that the Belgian motors run more smoothly; that in general the Belgian cars have a more up-to-date lubrication system; that several makers have shown great ingenuity in the rear axle construction; that many use ball bearing throughout.

Data obtainable from sixteen makers of Belgian cars show that all of them make four-cylinder cars. Three of them also make six-cylinders, two make one-cylinder cars and the two-cylinder type is non-existent. These sixteen manufacturers make fifty-one models of four-cylinder cars, six models of six-cylinder and two models of one-cylinder cars. The Ateliers Germain has the largest assortment, its catalog showing seven models of fours and four of sixes. However, several of these models practically are alike with the exception of the bore and stroke. Of the fifty-one models of fours, forty have shaft-drive and eleven are chain-driven, twenty-nine have the cylinders cast in pairs, twelve are of the en bloc type and ten have the cylinders cast separately. The one-cylinder cars are both shaft-driven, while of the sixes only one has the chain-drive and five have the cylinders cast separately.

A majority of the Belgian car makers list their chassis with tires, although quite a few, including several important houses, list only the chassis. In some instances it is stated by the maker that the price includes the chassis, the fuel tank and the repair tools. Hardly any manufacturer lists a car completely equipped. This is different from the custom of the land and it was a matter of much comment—very favorable, in fact—that at the recent Belgian show the Mitchell—made in the United States of America—was listed with full equipment. Some makers list their chassis without and with tires, and the majority only mention the fact that their chassis will hold any kind of body or that they make chassis specially long to take limousine or landaulet or double-phaeton de grand luxe bodies.

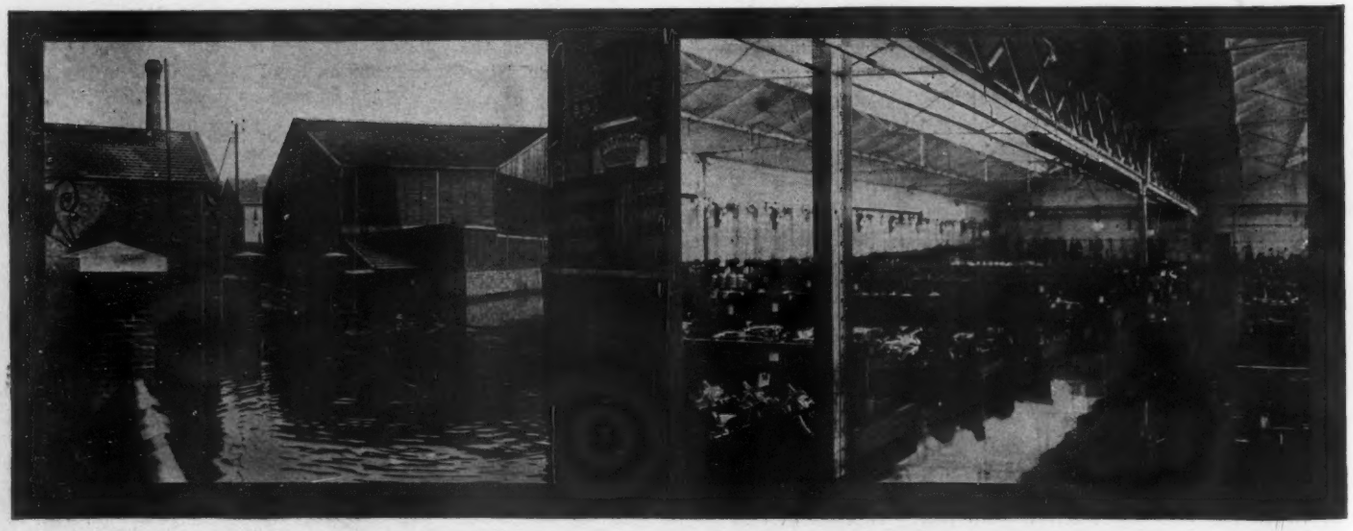
Motor Literature Scarce

To an American one of the incomprehensible angles of the business methods of the Belgian constructors is the lack or complete absence of advertising literature, illustrated catalogs of the year's models, etc. At the recent show probably two-thirds of the manufacturers did not have a complete 1910 catalog for distribution. Some had one or two-page circulars, which in some cases had a special notice informing the public that the 1910 complete catalog was either in course of preparation or that the present circular was only a synopsis of what the big catalog to come contains or would contain. Some of the catalogs, while having fine illustrations, had no captions accompanying them; in fact, it was a case of knowing the car in order to tell to what the particular illustration referred. As an example, there was the case of a concern which makes three models, all shaft-driven and only different in the bore and stroke. The two sides of each chassis were shown on opposite pages, but the stranger had no way of telling which was which. The same refers to various other important car parts shown in various catalogs. The Belgian manufacturer seems to think that anybody asking for the catalog knows all about the car in advance, as the agent of one concern in reply to the question of the writer said: "Why, don't you know that this is the 20-24?" "No, I didn't, otherwise I would not have asked," was the answer. "Well, you are the first one not to know about this chassis," said the astonished agent.

Press Not Enterprising

How little thought is given to the press, even the trade papers, by the manufacturers in general in this country can be gained from the following incident. The writer asked an agent for information and prices of the various models of a certain car. The agent asked for what purpose the information was desired. When told that it was for publication purposes the agent said: "Oh, then surely I cannot give you any details. You will have to speak to the director, who will be here later." When the writer called later the director was there. After a long wait, and after stating to the director for what purpose the information was desired, the manufacturer said: "Well, what good is it to me to give all this information for publication? Besides I would not pay a franc to get a line in your paper."

"Why, we don't make any charge for



RECENT FLOODS IN PARIS—SCENES INSIDE AND OUTSIDE OF THE RENAULT FACTORY

publishing such information," was the answer.

"Do you mean to say that your publication prints all such information, descriptions, etc., gratis?" asked the astonished director.

"With pleasure," said the correspondnet, "provided the manufacturer is willing to furnish the needed data or information."

FRENCH EXPORTS AND IMPORTS

Paris, Feb. 16—A general statement of the export and import figures of French trade in 1909 reveals the following state of affairs, proving a full recovery from the slump and financial crisis in the motor trade: France has even outstripped the figures for 1907 in its export turnover, which 2 years ago reached a total of $28,870,400, while the imported goods into the republic did not come up to 1907 by $230,200. There has been a rise in the demand for American cars in France, while in the states the sale of French makes has considerably decreased.

Imported from:	1908	1909
Austro-Hungary	$ 17,600	$ 1,000
Argentine	400	5,000
Belgium	201,400	241,800
Great Britain	111,600	255,800
Germany	532,600	430,200
Italy	282,200	288,800
Spain	15,400	26,400
Switzerland	75,200	15,120
United States	26,600	88,200
Other countries	12,800	13,600
	$ 1,281,800	$ 1,505,000

Exported to:	1908	1909
Algiers	$ 1,080,600	$ 1,770,200
Argentine	867,400	1,225,600
Austro-Hungary	67,200	161,400
Belgium	2,309,400	4,368,800
Brazil	427,400	378,800
Great Britain	12,211,200	12,568,800
Germany	2,091,200	1,980,400
Italy	436,000	577,400
Russia	665,400	881,800
Spain	568,600	667,200
Switzerland	386,000	487,400
Turkey	130,400	119,400
United States	2,200,600	1,610,600
Other countries	2,018,200	2,425,600
	$25,459,000	$29,523,000

MANITOBA WAKING UP

Washington, D. C., Feb. 28—Preceding a discussion of the good roads movement in Manitoba, Consul-General John E. Jones, of Winnipeg, in the Daily Consular Reports, tells of a long road planned through that part of Canada: A wagon road is projected from Fort William, Ontario, to Winnipeg, a distance of 436 miles. The Fort William board of trade has just passed a resolution in favor of this project, and the boards of trade of Winnipeg and Port Arthur will be asked to cooperate so that petitions may be presented to the provincial governments of Ontario and Manitoba urging the improvement.

"A determined effort will be made during the year to organize the municipalities of Manitoba in a good roads movement, and to that end an act will be submitted at the next session of the provincial legislature. This act will provide for a highways commissioner, whose duty it will be to lay out, instruct, assist and coöperate with the municipalities in the building and improvement of public highways in such municipalities as shall comply with the provisions of the act. The bill also provides that councils may pass by-laws, subject to referendum, for the construction of a proposed road, and such by-laws shall set out the estimated cost of such work and how such cost shall be raised by assessment. The cost of all roads under the provisions of the act shall be assessed by the municipality by uniform rate.

By-laws passed for the construction of a highway shall provide for the issues of debentures or stock, or both, at the option of the municipality, such not to exceed 3 per cent on the total assessed value of the property in the municipality, the term to run for 30 years, the government to guarantee the bonds or stock, and such debenture or stock, when certified by the municipal commissioner, shall be binding upon the municipality and shall not be questioned in any court of law. Road-making machinery of all descriptions shall be included in the cost of construction of any highway and debentures shall be issued. Motor cars are taxed, by the proposed law, $25 each and the fund realized from this tax, together with fines for infraction of any legislation governing such motor vehicles, is to be applied toward the administration of the law.

Statistics of Belgian Motor Cars

BELGIAN FOUR-CYLINDER CHASSIS

Car	Bore	Stroke	H.P.	How Cast	Drive	Circulation	Clutch	Wheel Base	Price
Metallurgique	2.95	4.3	12	En bloc	Shaft	.....	M. Disk	105	$1190
Metallurgique	3.3	5.1	16	En bloc	Shaft	.....	M. Disk	120	1700
Metallurgique	4.	5.9	26	Pairs	Shaft	Thermo-Syphon	M. Disk	130	2350
Metallurgique	4.9	5.9	40	Pairs	Shaft	.....	M. Disk	128	3200
Minerva	3.2	4.3	16	Pairs	Shaft	C-Pump	Cone	103½	1800
Minerva	4.	4.9	26	Pairs	Shaft	C-Pump	Cone	113	2700
Minerva	4.9	5.1	38	Pairs	Shaft	C-Pump	Cone	116	3200
Imperia	2.95	3.9	12	En bloc	Shaft	Thermo-Syphon	M. Disk	109	1380
Imperia	3.5	4.7	18	Pairs	Shaft	C-Pump	M. Disk	112	1900
Imperia	4.1	5.1	28	Pairs	Shaft	C-Pump	M. Disk	116	2100
Imperia	4.3	5.1	24-30	Pairs	Shaft	C-Pump	M. Disk	118	2500
Imperia	5.9	5.5	50-60	Pairs	Chain	C-Pump	M. Disk	120	3600
Vivinius	2.95	4.3	10-12	Pairs	Shaft	Thermo-Syphon	Fr'n Cone	96½	1380
Vivinius	3.5	4.3	16-20	Pairs	Shaft	Thermo-Syphon	Fr'n Cone	98	1780
Vivinius	4.1	4.7	24-30	Pairs	Shaft	Thermo-Syphon	Fr'n Cone	100-106	2400
Excelsior	3.3	5.1	14-20	En bloc	Shaft	Thermo-Syphon	Cone	118	1040
Pipe	2.95	4-3	12	Pairs	Chain	C-Pump	M. Disk	90	1400
Pipe	3.5	4.1	18	Pairs	Chain	C-Pump	M. Disk	118	2400
Nagant	3.5	4.7	14-16	Pairs	Shaft	Thermo-Syphon	Hele-Shaw	118	‡ 1700
Nagant	4.1	5.1	20-28	Pairs	Shaft	Thermo-Syphon	Hele-Shaw	120	‡ 2400
Nagant	4.1	5.1	20-28	Pairs	Chain	C-Pump	Hele-Shaw	118	‡ 2400
Nagant	4.9	5.9	35-45	Pairs	Chain	C-Pump	Hele-Shaw	133	‡ 3000
Springuel	3.5	4.7	16-20	En bloc	Shaft	Thermo-Syphon	M. Disk	112	1380
Springuel	4.1	5.1	28-35	Pairs	Shaft	C-Pump	Cone	114	2400
Springuel	4.1	5.1	28-35	Pairs	Chain	C-Pump	Cone	118	2500
Dasse	3.5	4.3	16	Pairs	Shaft	Thermo-Spphon	Cone	110	1600
Dasse	4.3	5.1	24	Pairs	Shaft	Thermo-Syphon	Cone	133	2300
Dasse	5.1	5.5	40	Pairs	Shaft	Thermo-Syphon	Cone	133	2800
Miesse	3.1	4.3	14-16	En bloc	Shaft	C-Pump	M. Disk	104	‡ 900
Royal Star	2.5	4.3	8-10	En bloc	Shaft	C-Pump	Cone	98½	‡ 850
Royal Star	2.95	4-7	12-15	En bloc	Shaft	C-Pump	Cone	110	‡ 970
Royal Star	3.9	5.1	20-25	Separately	Shaft	C-Pump	Cone	116	‡ 1600
F.-F.	2.5	2.7	10-12	En bloc	Shaft	Thermo-Syphon	Cone	102	‡ 930
Germain	3.1	5.1	14-16	En bloc	Shaft	Thermo-Syphon	M. Disk	104	1700
Germain	3.6	4.3	14-20	Separately	Shaft	C-Pump	Fr'n Cone	103½	1800
Germain	4.	4.3	18-22	Separately	Shaft	C-Pump	Fr'n Cone	103½	1930
Germain	4.7	5.1	28-35	Separately	Shaft	C-Pump	M. Disk	123	2800
Germain	6.1	6.5	70-80	Separately	Shaft	C-Pump	M. Disk	135	4400
Germain	3.9	5.1	16-24	Separately	Chain	C-Pump	M. Disk	119½	2000
Germain	4.5	5.5	24-32	Separately	Chain	C-Pump	M. Disk	119½	2600
F. N.	2.95	3.5	12-14	Pairs	Shaft	Thermo-Syphon	Fr'n Cone	110	‡ 1120
F. N.	3.4	3.5	16-20	Pairs	Shaft	C-Pump	Fr'n Cone	114	‡ 1480
F. N.	4.9	5 5	30-40	Pairs	Chain	C-Pump	Metal	118	‡ 2500
Auto-Mixte	.....	.....	15	Pairs	Shaft	.....	.....	106	1800
Auto-Mixte	.....	.....	24-28	Pairs	Chain	.....	.....	118	2400
Auto-Mixte	.....	.....	24-28	Pairs	Chain	.....	.....	118	2900
Linon	2.5	4.3	8-10	En bloc	Shaft	Thermo-Syphon	Alum.Cone	104	1155
Linon	2.95	4.7	10-12	En bloc	Shaft	Thermo-Syphon	Alum.Cone	112	1200
Linon	3.3	4.1	12-16	Separately	Shaft	Thermo-Syphon	Alum.Cone	112	1300
Linon	3.7	4.7	16-20	Separately	Shaft	C-Pump	Alum.Cone	118	1600
Linon	4.3	5.1	24-30	Separately	Shaft	C-Pump	Alum.Cone	120	2100

BELGIAN SIX-CYLINDER CHASSIS

Pipe	4.1	4.9	40	Pairs	Chain	C-Pump	M. Disk	140	3600
Royal Star	3.9	5.1	30-55	Separately	Shaft	.....	Cone	129	‡ 2200
Germain	3.3	4.3	14-20	Separately	Shaft	C-Pump	Metal	124	2500
Germain	3.6	4.3	18-20	Separately	Shaft	C-Pump	Metal	118	2700
Germain	4.	4.3	22	Separately	Shaft	C-Pump	Metal	130	3300
Germain	4.7	5.1	50	Separately	Shaft	C-Pump	Metal	134	4000

BELGIAN ONE-CYLINDER CHASSIS

Royal Star	3.9	4.7	6-8	En bloc	Shaft	Thermo-Syphon	Cone	88½	‡ 700
Linon	3.9	4.7	8	En bloc	Shaft	Thermo-Syphon	Alum.Cone	94½	900

‡ Chassis without tires

Reception Day at White Factory

CLEVELAND, O., Feb. 26—A novel event in the annals of motor car manufacturing was the reception held at the factory of the White company at St. Clair avenue and Seventy-ninth street, preceding the show. Although the greater part of the factory was completed and occupied 3 years ago, it was only last August that the new six-story administration building was completed and the wholesale offices moved from their former location in a downtown office building. Last Saturday's event, therefore, took on the aspect of a housewarming of the new administration building, as well as furnishing an opportunity for the visitors to make a thorough inspection of the factory.

The arrangements made for the reception were not unlike those usually made for a reception in a great private house. A canopy was stretched from the driveway to the entrance of the factory and there was a retinue of attendants to look after the comfort of the visitors. The leading caterer of the city was on hand with a half-hundred of his assistants and all the florists in town were called upon to furnish the decorations. The hours announced for the reception were from 1 to 5 o'clock and during that period more than 1,500 of the socially elect of Cleveland attended.

The guests were received by the directors of the company and their wives, as follows: Mr. and Mrs. Thomas H. White, Mr. and Mrs. Windsor T. White, Mr. and Mrs. Rollin H. White, Mr. Walter C. White, Mr. and Mrs. Henry W. White, Mr. and Mrs. Ernest W. Hulet, Mr. and Mrs. J. B. Johnson, Mr. and Mrs. Frederic S. Porter and Mr. and Mrs. Albert R. Warner. Then the guests in parties of a dozen or more were conducted throughout the factory. As all of the 10 acres of buildings are under one roof, it was possible for the guests to go into every department without having to go out of doors or otherwise to expose themselves to the elements.

After the guests had been conducted through the factory they were conducted to the banquet-hall, a large room which in normal times is used as a receiving room for raw material. No trace of its everyday function was visible, however, as the usual piles of castings and forgings had been removed and the room was filled with well-laden tables and decked with palms and potted flowers.

In connection with the reception a little souvenir bulletin was distributed, giving some interesting statistics of the factory, as follows: There are 1,500 employes and cars are now being built at the rate of fourteen per day, or eighty-four per week. The weekly production is divided as follows: Forty steam cars, forty gasoline cars and four trucks. Three months are required to build a White car. In other words, that amount of time elapses between the time that the raw material is received into the factory and the finished cars are shipped. The painting, varnishing, upholstering, etc., of the body of a White car requires 42 days. At the present rate of production there are in the factory at all times, 800 bodies in various stages of completion.

VISITORS SHOW GREAT INTEREST IN WHITE PLANT

ANOTHER NEW YORK BILL

Albany, N. Y., Feb. 28—Motor legislation took a new turn last week through a new measure introduced on Thursday for the purpose of regulating motor vehicle traffic. The new bill has been prompted by the Highway Protective Society and representatives of the police commissioners and the district attorney of New York city. The committee through which the bill was proposed was named by President Henry Clews, of the Highway Protective Society.

Many of the features contained in the Allds-Hamn bill of last year and which were so strenuously opposed by the motorists are to be found in this new measure, and they will again be hotly contested.

The provisions of last year's bill removing all definite speed limits and making the driver of the car like the driver of the horses, responsible for the proper use of the highway, is lacking in the present measure. Instead, speed limits varying from 15 to 20 miles an hour are prescribed

SHIPPING ROOM AT WHITE FACTORY TRANSFORMED INTO A BANQUET HALL

and a speed greater than 25 miles an hour in the open country is to be considered as prima facie evidence of reckless driving by the authorities.

While the speed limits are higher than those laid down by the present law and the provision fixing a rate of 4 miles an hour when approaching a bridge is removed and a maximum of 8 miles an hour substituted for it, the fact that there are fixed speed limits remains an objection and motorists contend that there isn't sufficient police force in the state to enforce them and that a law that is bound to be frequently violated with impunity is anything but a benefit.

The bill provides for the examination of operators as to their fitness and sets an age minimum of 18 years in order to prevent the entrusting of cars to children. It provides for reciprocity with other states in the matter of registration of cars, for severe penalties for running away from an accident without establishing identification, and for the power to revoke an operator's license at any time.

There is one feature of the bill which seems to meet with popular approval. It provides that in the case of persons charged with minor motoring offenses notice to appear at a hearing must be served and a warrant if he does not appear, rather than immediate arrest and trial.

Acting on an urgent message from Governor Hughes, the assembly committee on internal affairs is now preparing a motor bill from gleanings obtained from the various measures offered, which will in all probability be presented about the end of this week. Governor Hughes has arranged for a public hearing for all persons interested in motor legislation, which shall take place at Albany on a day to be named later.

Assemblyman Neupert has introduced in the legislature a bill which provides that every carriage other than a motor vehicle while running on a public highway outside of a city between the hours of sunset and sunrise shall be equipped with two lights, one in the rear and one in the front.

HOLDS OWNER NOT LIABLE

Milwaukee, Wis., Feb. 28—The Wisconsin supreme court has affirmed the verdict of the circuit court at Appleton, Wis., finding that John McNaughton could not be held liable for damages for the death of Anna Steffen, who was accidentally run down by a chauffeur in the employ of Mr. McNaughton, who was running the car without the owner's permission. The father of the girl brought suit for damages against the owner, who is a millionaire paper manufacturer, but the circuit court decided that he was not liable. The case brought out an agitation for the passage of a law making an employer of a chauffeur responsible for the man's acts at all times that he is so employed, but efforts in this direction were unsuccessful.

RECEIVING GUESTS IN THE SALESROOM OF THE WHITE FACTORY AT CLEVELAND

The Readers' Clearing House

EDITOR'S NOTE—In this department Motor Age answers free of charge questions regarding motor problems, and invites the discussion of pertinent subjects. Correspondence is solicited from subscribers and others. All communications must be properly signed, and should the writer not wish his name to appear, he may use any nom de plume desired.

LIKES LEFT-HAND CONTROL

FRANKLIN, O.—Editor Motor Age—I would like to say a word in regard to the left-hand drive and control. I believe that the left-hand drive is better than the right for this reason: I find that in passing a rig to the left I can see the road in front sooner if I am sitting on the left than on the right, and as a vehicle coming toward me would pass on the same side of the vehicle in front of me, as I would, I may meet it head on. I am glad to see in Motor Age that the new Peerless has the control levers on the right of the steering column. While some wagon brakes are placed on the left of the wagon, this is poor practice, because the lines are always held in the left hand and the whip in the right. For this reason the control levers should be on the right of the wheel, and the left hand always on the wheel, as it is as good for the wheel as the right, but not so quick or sure for the levers. There is one point overlooked, and that is in passing a rig from behind you are compelled to look out for yourself more than when you meet one, so that as you sit on the left and going at a higher rate of speed, you can give every bit of available road. I thing there is a great need of a light touring car with easier riding qualities than any at present seem to have. I believe there is a field for the easy-riding, light, inexpensive car; not a car of great speed, but a car that can take the hills easily, can travel about 35 miles per hour and that can run at 4 or 5 miles an hour in crowded streets without stalling or heating; a car that will be easily handled so that a woman may drive it in perfect safety, because it does not require great strength to throw out the clutch or set the brakes tight enough to hold the car, and one that is not too hard for her to crank at starting. I like the hints Motor Age gives the amateur and the expressions of the different motorists in regard to cars and car designs. I find a great to help me in the caring for my own machine. I do all my own adjusting and caring for my car. I have driven over 3,300 miles without a puncture or breakdown of any kind, and have my car running as sweetly today as ever it did.—E. H. Douglass.

HANDY MECHANIC'S MIRROR

Racine, Wis.—Editor Motor Age—Anyone about a garage, assembly floor, test shed or in fact anyone who has much to do with machinery has doubtless had occasion to inspect the inside of a cylinder or other similar cavity when the spark plug hole or other small passage was the only possible opening through which to look. Nine times out of ten, it is also necessary to allow light to enter through the same hole that one must look. If a lamp is placed at the entrance, it usually interferes with the line of vision or blinds the observer. To care for just such emergencies, the writer has made it a practice to keep a pocket mirror, through the back cover of which is made ¼-inch hole. This hole does not extend through the glass but the silver is removed so that one can see through easily. Thus provided, one can throw a beam of light from almost any source into the cylinder or cavity and while the mirror protects his eye from the blinding direct rays of light, he is able to get a clear vision through the hole at the center of the mirror. The fact that the hole does not extend through the glass, protects the eye of the observer against chips or other particles which may be thrown from the passage.

In order to inspect surfaces which cannot be viewed directly, a very small mirror hinged to the end of a stiff wire will be found convenient in many cases where the peephole is large enough to allow of inserting it. The hinge should be stiff enough to hold the mirror at any angle desired. As illustrated, Fig. 5, one can with this contrivance inspect the other side of the wall nearest him.

The value of the latter device is greatly increased if instead of a stiff wire a tube is substituted and a very slender low-voltage lamp is placed in a pocket near the mirror as shown. The tube offers protection for the lamp as well as forming a conduit through which the flexible wires are led out to the battery cells. For most cases, incandescents such as are used in pocket lamps are small enough, but for special work it may be necessary to resort to the lamps used in surgeons' cathascopes. That they are small enough for most exacting conditions will be realized when one considers that such, when combined with a mirror arranged somewhat as the one being discussed but much smaller and inclosed, are used by surgeons for examining the interior of a patient's bladder. Where lamps cannot be procured from dealers in electrical supplies, make inquiries from any dealer in surgeons' and physicians' supplies.—M. R. Wells.

OBJECTS TO FRONT SPRING DESIGN

Oklahoma City, Okla.—Editor Motor Age—May I ask through the Readers' Clearing House of the Motor Age why so few cars use the elliptic springs, and why the torsion rods cannot be dispensed with. It is our experience that the cars using elliptic springs without torsion rods are the most comfortable on our western roads. Frequently it is said the Franklin rides so comfortably, or the little Maxwell, which has four elliptic springs and torsion rods, but they extend well to the forward end of the frame. I mention these two to illustrate my point, the Franklin springs being set at an angle, Fig. 1, to take up road shocks; and the Maxwell torsion rods, Fig. 2, which should be longer as per dotted line, so jars and shocks will not jerk upon frame under occupants. I wish to ask why so many turn the front end of the frame down as in Fig. 3. when the shocks are as per dotted line, why do they not turn front end of frame upward, as

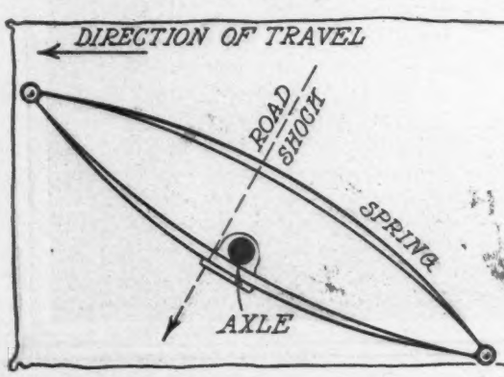


FIG. 1—FRANKLIN SPRINGS

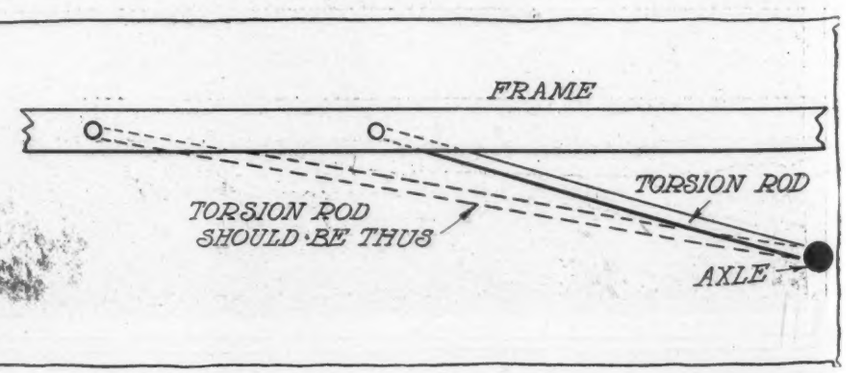


FIG. 2—MAXWELL TORSION RODS

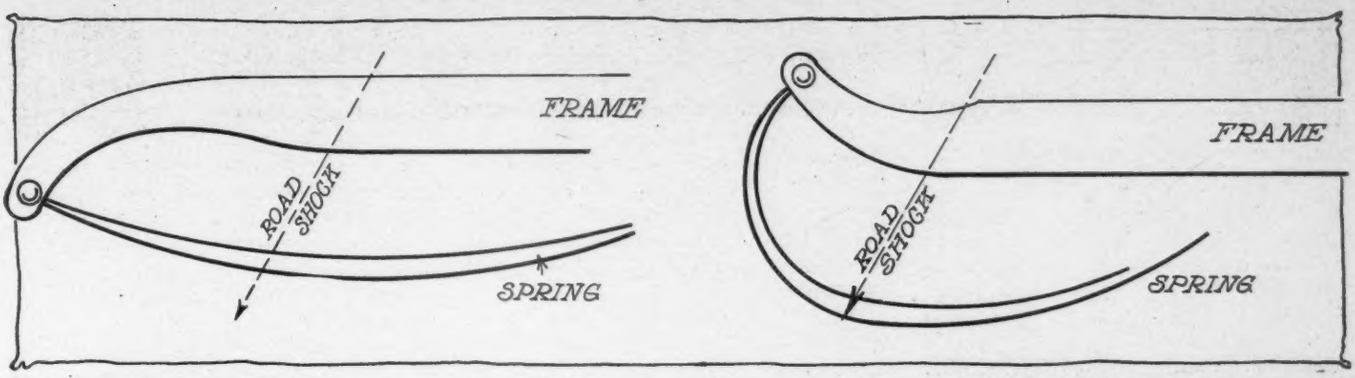


FIG. 3—SHOWING FRONT END OF FRAME TURNED DOWNWARD

FIG. 4—SHOWING FRONT END OF FRAME TURNED UPWARD

Fig. 4, so the spring will take up the road shock, thus making the car ride comfortably, as well as protect the tires? Certainly the elliptic should be the better. I ask these questions hoping the motor car manufacturers may derive benefit as well as the general public, as there are many good cars that are very disagreeable to ride in on account of their faulty spring suspension, which could be remedied at once by a change of springs; a long, wide elliptic for pleasure in place of the half or three-quarter for solid comfort is my experience. It will be noticed the Franklin even set its spring under the axle to secure width.—B. R. H.

The semi-elliptic spring has come into factor at the front end of cars in that it allows for a rigid support of the motor. The Franklin spring is mounted as you suggest and is ideally arranged for absorbing shocks caused by road irregularities. On some of the latest foreign cars, notably some of the de Dion types, the front axle is tilted slightly backward so that the position of the semi-elliptic springs is similar to that shown in Fig. 1, although the tilt is not so great. The fact that pneumatic tires are used is reason why many makers have not adopted the elliptic, as the pneumatic tires absorb the jar and so the necessity for mounting the spring in the most advantageous position has not been gone into as thoroughly as it might. If torsion rods are not used with springs of this type in front, the strain on the springs is particularly hard when the brakes are applied.

Regarding torsion rods, it is becoming more and more customary to fit them. When the torsion rod is absent on light cars a galloping sensation is often experienced when starting and just before the high speed or while the high speed is being engaged. The radius rods avoid this.

The type of spring you illustrate in Fig. 4 would give a higher center of gravity at the forward end of the car than most makers want. It would also allow of more side sway which would make the steering problem harder. The tendency with several high-priced makers this year is to employ flat front springs, so that the car is carried as low as possible and the tendency to side sway reduced to a minimum. In designing a car the frame, the axle, and the spring are a unit, while certain peculiarities of springs might seem more advantageous in one respect they offer objections in others, so that the manufacturer is forced to use that which carries with it the most advantages.

Motor Age would be pleased to receive communications from readers throughout the western country who have had experience with different types of springs. In the east where good roads abound the spring question is a simple one, but in the west where cars have to traverse the trail conditions are entirely different.

ENAMEL FOR FENDERS

Hightstown, N. J.—Editor Motor Age—Through the Readers' Clearing House will Motor Age tell me what material is used in finishing fenders in block for motor cars? Is it enamel baked on or an air-dried paint? If it is an air-dried enamel, is it put on with a brush? Are the fenders dipped or is it flowed on? They have the appearance of being flowed on in some I have seen. I wish to have some similar iron work finished and am anxious to know where to procure this durable finish. Of whom can I procure this iron varnish?—E. H. Savige, Jr.

There are two methods of finishing the fenders of motor cars which are generally employed now. The oldest and perhaps most generally employed is that in which air-dried paint is used; the other, which is more easily applied and steadily growing in popularity, is by means of an enamel which is baked on. The air-dried paint process is one which consumes a considerable amount of time and skilled labor, as may be realized from the following list of operations ordinarily performed by a local painter: The first coat is a priming coat; this is followed by a first, then a second coat of lead; following this comes the putty glaze, which is followed by an application of half and half, half roughstuff and half putty; after this, five successive coats of roughstuff are applied; then, a guide coat, a rub-out of roughstuff, a first and second coat of color and a coat of color varnish; next in order there is a first coat of rubbing varnish, a first rub-out of varnish, a second coat of rubbing varnish, and a second rub-out of varnish. With a new process of baking on enamel, recently invented, the enamel is applied with a brush in a thin coat and then exposed for 5 hours to a temperature ranging from 160 to 200 degrees Fahrenheit, according to the color of the enamel. The air-dry paints may be obtained from any paint supply house, and the baking enamels from a dozen or more concerns who make them.

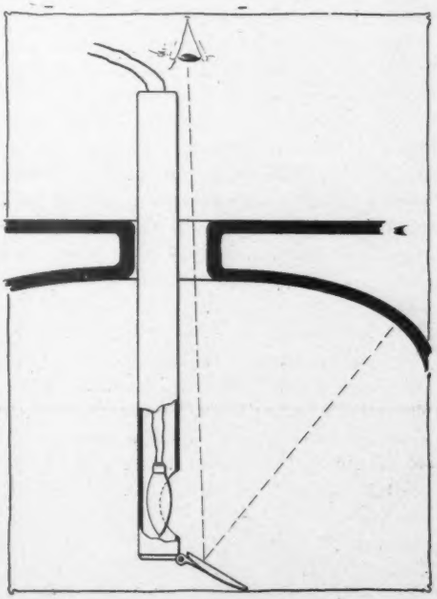


FIG. 5—LAMP IN A CYLINDER

CRITICIZES MORRIS' OILING

St. Angar, Ia.—Editor Motor Age—In Motor Age, February 10 issue, page 60, J. H. Morris, of Trenton, N. J., proposes using a feed pipe on each side of his crankcase partition, which is liable to cause him trouble from overfeeding, due to air entering one pipe and the oil feeding through the other. I have fitted the vacuum system to several model N Fords. The manufacturers sent these out with a compression oiler secured by two of the capscrews holding the forward pair of cylinders to the crankcase. In this position it is possible to give the feed pipe a good downward slope, preventing air pockets, and its rigidity eliminates the danger of air leaks. An automatic valve opened by inserting and tightening the filler plug and closed by a spring when the plug is removed, eliminates any danger of either

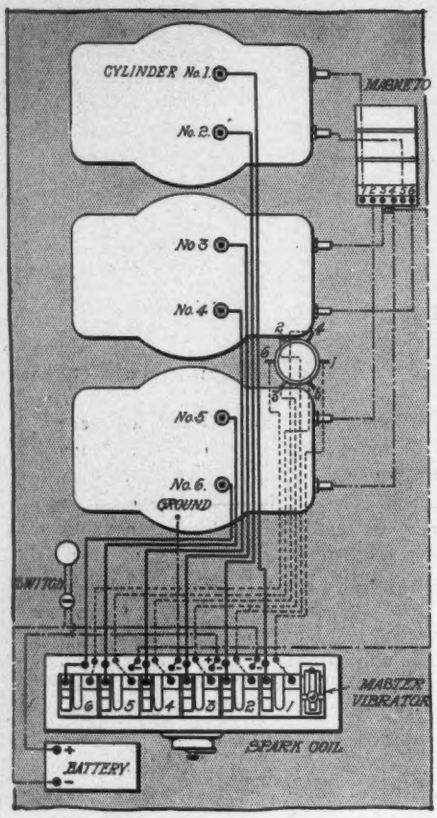


FIG. 6—PIERCE-ARROW WIRING DIAGRAM

starving or flooding the engine. One feed pipe placed under the center bearing in the forward crankcase compartment, with its opening nearly touching the bottom of the case, furnishes sufficient oil for the whole engine, the splash taking care of the rear compartment.—Guy B. Carroll.

LIGHT VERSUS HEAVY CARS

Coats, Kan.—Editor Motor Age—I have read with much interest the many valuable articles in Motor Age and advise every man who buys a car to subscribe for it, because it will aid him in learning and caring for his car and in the end save time and expense. But the question of light versus heavy cars becomes interesting. I have been driving for the past 3 years and during that time have driven eight different makes of cars—both heavy and light. Most of my driving has been over country roads and the distance covered about 65,000 miles. I cannot understand how any man can advocate a car that is heavier than it has to be to do the work required. A great deal has been said in these articles about heavy cars riding easier. That depends in what car you ride. I have ridden in light cars that rode 100 per cent easier than some heavy ones. I have four different makes of cars at the present time, and the light car is the easiest riding by far. Another light car is not so easy, but the riding of a car depends almost entirely on the length of the wheelbase and the spring suspension. The only argument I can see against the light car is whether it is strong enough, and I have satisfied my mind on that point from experience in that it costs only from one-fourth to one-third as much to maintain and operate a light car as a heavy one, it depending, of course, on the weight of the heavy car. Most of my driving has been with the light car, and as I never have had a breakdown and never was pulled in, I am convinced that the light car of today is strong enough for the load it is designed to carry over any kind of roads a motor car may negotiate, provided the driver is not drunk or insane. A heavy car could not overcome this difficulty. Even in an accident a heavy car causes more expensive wrecks under the same conditions. The elasticity of a light car is much greater—a condition so longed for by motorists. They can attain speed quicker, stop quicker, and this fact alone has saved more than one smashup. I have jumped from in front of danger and stopped in the nick of time where it would have been impossible with a heavy car. When I read of the advocates of heavy cars I believe they are prejudiced. If not, why are all the manufacturers striving to lighten cars? —J. W. Farmer.

IGNITION PROBLEMS

Rochester, N. Y.—Editor Motor Age—Will Motor Age, through the Readers' Clearing House, explain the following? 1—In wiring up electric lights from the sparking battery I short-circuited or grounded them, and at once the vibrator on the coil started to work, with the switch in the off position. 2—Can Motor Age explain the wiring on the 1910 Pierce-Arrow, especially with regard to the switch part of it? 3—What are the advantages of a master vibrator over the old style, and how does it work? Won't the platinum points give out sooner on account of the increased work?—Subscriber.

1—Without knowing the system of wiring employed in your lighting system Motor Age cannot explain just how the short-circuit came about, which closed the ignition circuit and caused the vibrators to buzz?

2—The wiring of the 1910 Pierce-Arrow ignition systems is shown in Fig. 6, and a detail wiring diagram of the switch itself in Fig. 7. In the switch illustration, the connection M is the magneto wire, the wire connected to the switch lever at the point G the ground wire, and B is the other wire from the battery. These connections are a part of the permanent wiring system of the coil and are not to be detached, external connections being provided for the detachable wires from the battery, magneto and ground contacts underneath and outside of the coil-box. When the switch lever is in the magneto position the nipples N of the switch do not touch any of the switch connections, but when in the off position connection is made through the nipples N between the wires M and G, thereby short-circuiting the primary current of the magneto, the current flowing from the wire M through the switch blade M1, then through the nipples and switch lever to the ground wire. When the switch lever is in the battery position the nipples N of the switch make contact between both the blade M1 and the blade B1; thus the battery circuit is closed and the battery system brought into operation, while at the same time the ground circuit of the magneto is also closed, rendering the magneto system inoperative.

3—With the ordinary type of spark coil, employing one vibrator for each coil, it is necessary to adjust each vibrator independently and unless they are adjusted so as to draw the same amount of current and are identical in construction and insulation, the results obtained from the engine are anything but uniform, for the reason that a heavy current passing through a coil will give a later spark in the cylinder of the engine than a light current would under the same conditions. Take, for example, a four-cylinder engine operated from a four-cylinder individual vibrator coil. We will assume that the coil connected to No. 1 cylinder is adjusted to draw ½ ampere and the engine is firing exactly on dead center; No. 2 coil may be taking an ampere, with the result that No. 2 cylinder is firing possibly two or three degrees beyond center; No. 3 cylinder may be taking 2 or 3 amperes, with the result that it is firing possibly five or ten degrees beyond center; No. 4 cylinder may be taking ¼ ampere, with the result that it is firing before the piston reaches center. Thus, while you have an engine which to all outward appearances is firing regularly, at the same time, such is not the case, due to the unequal adjustment of the vibrators. This condition is overcome in the master vibrator type of coil for the reason that when you adjust the vibrator to draw a given amount of current the adjustment is absolutely the same for all coils, with the result that a uniform ignition is secured.

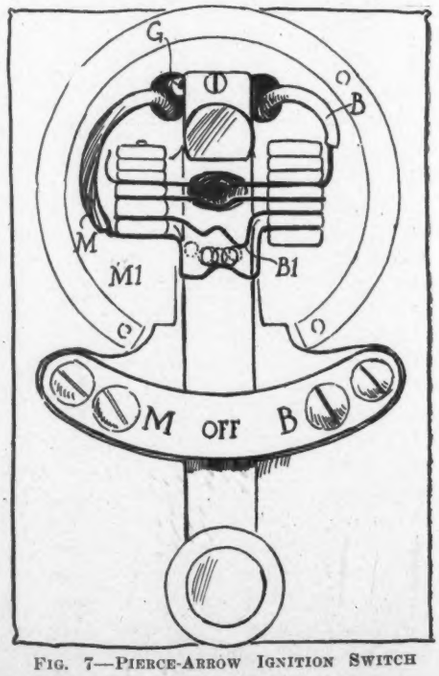


FIG. 7—PIERCE-ARROW IGNITION SWITCH

The Motor Car Repair Shop

Hints to the Amateur

ALTHOUGH apparently a very simple job, the overhauling of a driving chain is not the simplest job an amateur can tackle unless he has suitable tools and some skill as a mechanic. When a chain has become badly worn from hard service, it generally is considered most practical to replace the entire chain with a new one; but if some parts occasionally are less highly tempered than others, or contain some hidden defect, or perhaps because of some unusual local strain some links will be found in exceptionally poor condition when the rest of the chain is still very good, then the replacement of parts should be made whenever it is found that one part is badly worn, or when a rivet or bushing has become loose in the side plate from some unusual strain. Repairmen often speak of the stretching of a chain; but, in the strict sense of the word, although a chain gradually will become longer after steady service, it does not stretch, the elongation being due entirely to the aggregate wear of the many component parts. When a repair is necessary, perhaps the most practical method and easiest is to employ master-links, or sections with masterlinks at both ends. These, however, are not always on hand and in such cases it is necessary to use regular inside links. As chains are not all similar in construction, one attempting a repair always should endeavor to use parts of the same make, as much difficulty may be met with if an effort is made to mend one make of chain with pins, rolls or bushings from a chain of a different manufacturer. Of the many types of detachable and riveted link chains in use, the riveted chains are most commonly employed in motor car building.

The riveted chains are those in which all links are riveted on both sides with the exception of the master, or connecting link. These are also the most difficult to repair. The parts which go to make up one end of a riveted chain are shown in Fig. 1, and consist of a pine, a bushing, a roller and side links. To assemble these, they first should be smeared with graphite and grease, and the roll slipped on; the ends of two side links are then pressed on to the ends of the bushing, which is designed for a driving fit, that is, a few light taps of a hammer should be all that is necessary to drive the links up to the shoulder on the ends of the bushing. The rolls and bushings at both ends of the link, of course, are assembled at the same time. To complete the assembly, the connecting side links are driven on to the ends of the pins, which are designed for a force fit, and the ends then are lightly peaned over a mere trifle to secure them.

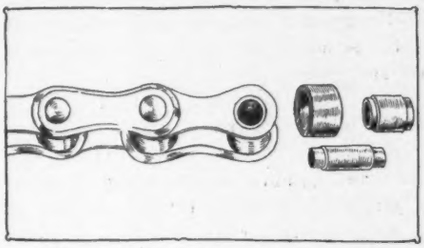


FIG. 1—FEATURES OF A RIVETED CHAIN

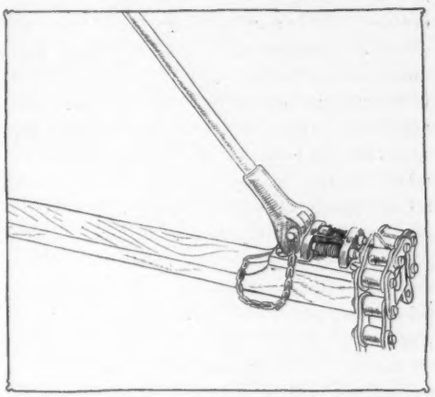
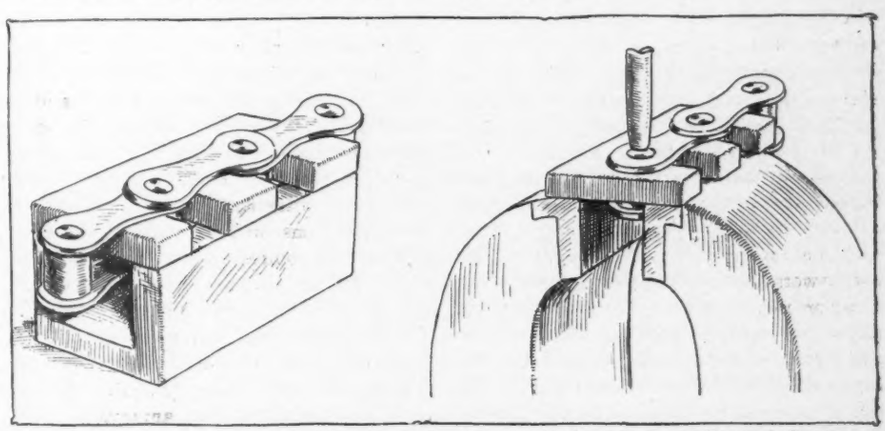
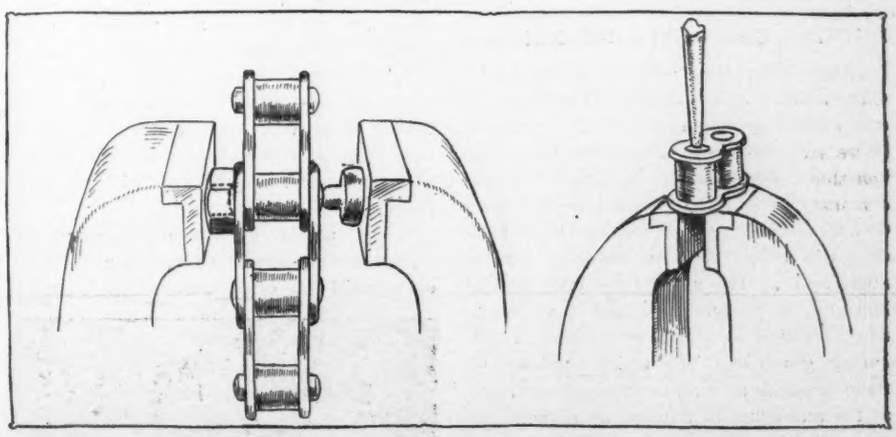


FIG. 2—SPECIAL DISASSEMBLING TOOL

Two common errors generally made by the amateur or the young repairman are shown in Figs 5 and 6, and consist in an effort to remove the pins of a chain designed as shown in Fig. 1. In Fig. 6 the workman opens the vice about ¼ inch, so there will be just enough clearance for the pin as it is supposed to drop out when the pressure is brought to bear upon its upper end by means of the drift and hammer. In Fig. 5, the link to be dis-assembled is fitted into the vice, with a nut at one end of the pin and a stud at the other end; it being intended that when the vice is tightened the enormous pressure brought to bear upon the end of the pin through the stud will be sufficient to start it. Either one of the methods is quite mechanical and would be quite successful were it not for the shoulders on the pin in Fig. 1. To dis-assemble a chain of the type shown in Fig. 1, therefore, recourse is made to a special section of heavy channel iron and a plate which is recessed to receive a link of a chain as illustrated in Figs. 3 and 4; or to a special tool such as is shown in Fig. 2. Either of these tools may be obtained from the manufacturers of this type of chain without any trouble.



FIGS. 3 AND 4—A CORRECT METHOD OF DISASSEMBLING ONE TYPE OF RIVETED CHAIN



FIGS. 5 AND 6—RESPECTIVELY SHOWING TWO COMMON ERRORS OF CHAIN DISASSEMBLING

Manufacturers' Communications

NEW FORMULA DISCOVERED

BUFFALO, N. Y.—Editor Motor Age—Few months pass by that some plan for rating the horsepower of motor car engines is not advanced. Motor car owners as well as engineers are generally interested in these formulæ as looking forward to the millennium when someone will discover a plan of rating that will be adopted, by all manufacturers, and do away with much of the confusion that results from the dozen or so standards now in use. At present in this country the A. L. A. M. standard of squaring the bore, multiplying the result by the number of cylinders and dividing by 2.5 is the only one in general use in this country. In the A. L. A. M. handbook the rating of all cars made by members of that association is fixed by that plan.

Recently a new formula, known as the Denby-Marshall formula, has sprung into prominence in England. It differs from the A. L. A. M. standard in that it recognizes the stroke instead of, as is the case with the A. L. A. M., basing the calculation on a piston travel of 1,000 feet per minute. The Dendy-Marshall formula includes squaring the bore, multiplying that result by the stroke and then by the number of cylinders and dividing the result by 12. Taking the three Pierce-Arrow motors as instances the A. L. A. M. and the Dendy-Marshall systems give these results:

Company's	A. L. A. M.	D-M.
36	38.4	38.0
48	48.6	48.1
66	66.2	75.8

From this it will be seen that on medium horsepowers where the bore and stroke do not vary too much from the square the results are about the same while on high horsepowers the new English system gives a higher rating. The reverse is true on motors of small horsepower since a bore and stroke of 2½ by 3 inches on a six-cylinder motor would give 15 horsepower by the A. L. A. M. formula and by the Dendy-Marshall system only 9.4 horsepower.—Pierce-Arrow Motor Car Co.

PUTTING CAR INTO COMMISSION

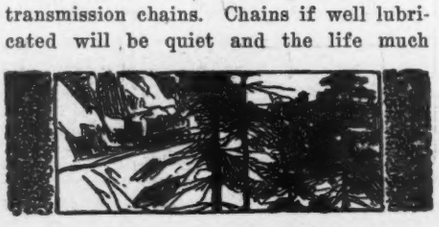
Jersey City, N. J.—Editor Motor Age—Only when a car is thoroughly overhauled and inspected preparatory to being placed in use are important parts given the attention they should have. As proper lubrication may be ordinarily taken as the ratio of depreciation, a lubricant should be used that will reduce friction losses to a minimum and at the same time one that is lasting. A perfect lubricant that meets all the above is found in the flake lubricating graphite. The chief function of flake graphite as a lubricant is to get right at the real cause of friction by eliminating the cause, for a metal surface no matter how carefully polished, will be found to be filled with minute irregularities when examined under a strong microscope, having all the appearances of hills and valleys. It is the scraping of these high spots that is the real cause of friction.

Pure flake lubricating graphite has a strong affinity for metal surfaces and the thin flakes by becoming pinned to the high spots and building up the low spots, form a graphite-to-graphite contact instead of a metal-to-metal contact. This graphite veneer-like coating is exceedingly smooth and very tough. Great care should be exercised in thoroughly inspecting the car after being assembled to make sure that every detail is in perfect order and that there are no defective parts. Particular attention should be given to the steering and braking devices, for the safety with which a car may be driven at a given speed depends entirely upon the braking power. Every bolt that one may be obliged to remove should be removable. The threads of all bolts should be smeared with flake graphite and oil mixed to a paste like consistency. This mixture should also be applied to the spark plug threads.

Flake graphite should be rubbed into the seats of inlet and exhaust valves and upon the guide stems. All the old oil and dirt should be removed from the crankcase and new oil added with finely pulverized flake graphite used in the proportions of a teaspoonful to every quart of oil. Rub flake graphite on the inside of tire shoes. It will prevent the inner tube from sticking and is better than chalk or soapstone. Paint the rims with a mixture of flake graphite and quick-drying shellac varnish about the consistency of a thick cream, and the rims will never become rusted.

Pack all bearings, gearcases, wheel bearings, etc., that are designed for grease lubrication with flake graphite grease. Squeaky springs are an annoyance that may be easily remedied by simply lifting the body of the car so that the axles hang by the springs, and working in between the leaves a mixture of flake graphite and oil—about the consistency of thick cream—with a knife blade. The leaves then will slide easily over each other, the squeak will be cured for practically all time and corrosion will not take place.

Do not use sticky oils or greases on the transmission chains. Chains if well lubricated will be quiet and the life much prolonged. The chains may be best treated by first cleaning in kerosene to cut the dirt and grit. Then melt some chain compound—which is marketed in 3-pound bricks and have flake graphite for its base—occasionally stirring to prevent the graphite from settling, and immerse the chain. After soaking in the heated mixture for a time take the chain out of the compound and dip in a bucket of water. This sets the compound, after which it should be hung up and the superfluous compound wiped off. Where it is not convenient to immerse the whole chain, draw it slowly through the melted compound. By this treatment the chain will be well-lubricated with a lubricant that will not hold dirt or grit. It is not good practice to use grease or oil, as this easily picks up foreign matter. However, good results may be had by rubbing the chain well with a cloth on which fine flake graphite is dusted.—Joseph Dixon Crucible Co.



NEVER GIVE UP

Indianapolis, Ind.—Editor Motor Age—The present great interest in motor racing is such as to cause the manufacturer to figure seriously so that he may receive the best results from this method of advertising, which is so effective in addition to being so expensive. And it is to the manufacturer who has watched racing from a distance without entering contests who turns his mind to this method of advertising that I speak.

Too many factories decide to enter into racing in a smal way, figuring on making a fair showing and when they fail consider that the racing game is a poor way to do their advertising. This in the first place is a mistake, as a small way is a poor way to enter into this sport. The manufacturer who hazards the reputation of his car on one driver and one racing car is taking a great risk. In the first place something may happen to the car that puts it out of the event, and thus his whole chances, which are pinned upon one entry, fail, and this may be repeated in several events so that he sees no consoling results of any kind. Then again his car, with its one selected driver, may be improperly handled, in which case the result will be the same.

The driver blames the car or ill-luck and what does the factory learn? Another fault with one car and driver is that the driver is usually well satisfied with himself and the car also and makes no keen preparation. Take a team of three drivers and notice the difference.

One driver tunes his car so that it travels a little faster than his team mates', both the other team mates then spend

weary hours trying to coax from that invisible nowhere sufficient speed to overcome the rival on their own team, well realizing that the successful driver of the team becomes its star and this brings promotion and triumph.

It was said last year of one particular racing team that was well among the winners in most of the events that the drivers were more anxious to defeat their team mates than their rivals.

Before an important event they would be seen tuning and preparing with every possible energy. Their work on the course was done with skill to keep their rivals from learning what their cars would do, while each watched the other like a hawk. When the race was on, the way they fought each other mile after mile, usually wore their rivals out, so that one or more of the team was almost always at the front.

It is this fighting spirit that wins motor races, as well as ball games. No baseball team ever won a pennant that was not known as a team of scrappers.

And this same appellation applies to motor racing. We pin our faith in the merits of our car and then get a team of good drivers to pilot them. This has been the basis on which we entered the racing game. We did not hire famous drivers. We hired good ones and they have since become famous by winning consistently.

The manufacturer who puts up a good article and works on this basis will not become discouraged with motor racing, but will be one of its upholders. Another good idea is to have a carefully selected team that will play this sport in a fair manner. This requires care in selecting the drivers and also in managing them.

I am a firm believer in racing, and our policy is to continue in the game for the present season. Our output is well sold; in fact, it is hard to make deliveries; but still our purchasers derive the benefit of our experience, as, when they buy one of our cars, they know that it has a reputation for running all the time.—Howard Marmon, Nordyke & Marmon Co.

CAUTION IS NECESSARY

Tarrytown, N. Y.—Editor Motor Age—An owner of a car can guard the upkeep expenses by being sure:

That he has plenty of oil in the lubricator, that it is feeding properly and that the oil is the best. A little oil in the right place at the right time will forestall a big repair bill.

That all bearings are properly adjusted. One loose bearing has a tendency to loosen others, causing knocks, loss of power and crystallization of metal. More harm can be done to a motor by running it on loose bearings for a few days than would result from a year's ordinary use. Do not neglect this.

That the cylinders, pistons and valves are not coated with carbon. Kerosene oil will not remove it once it is baked on, without the assistance of a scraper. Make one and use it.

That the steering connections are cleaned and oiled. This will prevent the excessive wear and play so common in steering gears.

That the front wheels are properly adjusted. It will save tires and cones.

That the rear axle and drive pinion bearing are always well-oiled, and that the universal joints never are allowed to become dry.

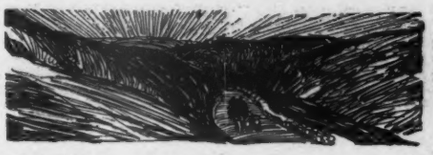
That all bolts and nuts are kept tight. Ten minutes' use of a wrench each week will prevent many a break.

That the motor is kept clean. Better results will be obtained from the machine, and better work from any repair man, who is obliged to work on it. A dirty motor is a sure sign of neglect.—J. D. Maxwell, vice-president Maxwell-Briscoe Motor Co.

REFORM STOCK-CAR CONTESTS

Cleveland, O.—Editor Motor Age—Additional restrictions are necessary in order to ensure that cars taking parts in contests, particularly in races, are bona fide stock cars. I think no one will dispute the statement that there has been much ground for dissatisfaction with and distrust of the stock-car racing situation. An examination of contesting cars at race meets is necessarily of the most superficial character and generally discloses nothing more than that the cylinders are of the proper dimensions and that the general arrangement of parts is the same as in the stock model. Such an examination cannot reveal, for example, whether or not the racing car has a chrome-nickel steel crankshaft—when real stock cars of the same make use only common machine steel—or whether or not there has been similar substitution of materials throughout. The public has had ample reason to be suspicious. For example, it has not understood why it was necessary for a stock car which competed one week in New York to be rushed by express to compete in Minneapolis or New Orleans the next. The ordinary citizen would imagine that any car in Minneapolis or New Orleans would fully size up to the true capabilities of the stock car and could be used.

With this unsatisfactory situation confronting motor racing, why should we not avail ourselves of the experience of a much older line of sport, namely, horse racing, wherein various protective measures have been devised for safeguarding the interests of the public as well as of contests. I refer particularly to the regulations covering what are known as selling races. I believe that these regulations could be applied with advantage to all stock-car racing in this country, with the result



that any car entering a stock-car race could be claimed by other contestants in the race on payment of the list price of the car. By the enactment of such an amendment to the motor racing rules, motor racing in this country would receive a tremendous boom. There are many manufacturers and agents who would be very willing to engage in various kinds of speed contests if they were assured that they would be confined to stock models. But at present they feel that the cars which are being sent first to one city and then to another to engage in race meets are not bona fide stock cars. Under the proposed rule, any maker who engaged in a race and who suspected that one of the cars contesting against him was not a stock model, could simply bid it in at the list price and could qiuckly assure himself whether or not such was the case. With this regulation enforced, the practice of building specially-constructed cars for racing would be discouraged, there would be many more cars entering races and the public and the industry at large would benefit largely from the new conditions.—Walter C. White, White Co.

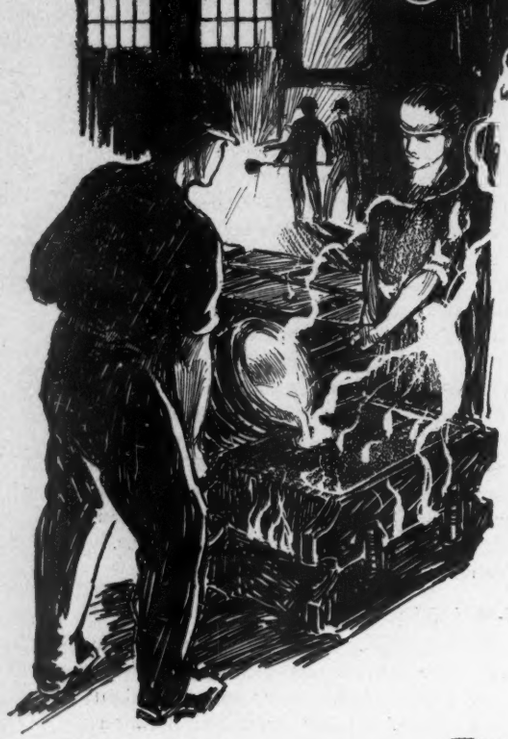
E-M-F DAILY PRODUCTION

Detroit, Mich.—Editor Motor Age—We notice the Detroit correspondent of Motor Age in last week's issue made a slight error which, we are sure, was unintentional. In his article he states "The E-M-F company made a record last week by shipping sixty-five cars." What he evidently meant to say, since these are the facts, is that the E-M-F company shipped sixty-five cars per day last week. The factory reached that capacity February 21 and is running steadily at that rate now and will keep it up until July 1. We are speaking now of E-M-F 30 cars only, and we believe this is a world's record for a car of this size.—E-M-F Co.

FAVORS LARGE TIRES

Akron, O.—Editor Motor Age—To have large enough tires on his car means more to the motorist than he may at first realize. Motor car manufacturers fortunately are coming to appreciate the true merit of large tires more this year than ever before, as will be seen by the increases that many have made over last year's equipment on cars that are being exhibited at the shows. A tire of large diameter rides over road obstructions with less jar and less interruption to the momentum of the car, hence is more comfortable to the occupant. More important still is the fact that the larger tire presents a greater portion of its circumference to the road, thus dividing the shock over a greater surface area and conserving the strength of the tire. Again, the larger the tire the greater the air cushion back of the blow. An adequate-sized tire always will stand several times as much hard usage as a smaller one on the same car.—H. S. Firestone, Firestone Tire and Rubber Co.

Making Motor Car Cylinders



NEARLY every early effort in connection with the production of cylinders for use in motor car motors was attended by difficulties which at the time seemed almost insurmountable. Prior to the application of internal combustion motors to motor car work, cylinders were made with the walls from 5/8 to 3/4 inch thick and the compression obtained was approximately 40 pounds per square inch, so that the explosion pressure, measuring at the peak of the wave, rarely ever exceeded 200 pounds per square inch. It then was thought that cylinder walls would have to be relatively thick, primarily due to lack of strength sufficient for the purpose, and then in order to be sure that the cylinder walls would be sufficiently tight to retain compression.

Daring designers, particularly those who were a little more familiar with the characteristics of gray iron, reduced the wall thicknesses to even less than 1/4 inch in some cases, and they considered that 5-16 inch was a limit which bordered upon extravagance. For a time this limitation of the wall thicknesses resulted in much trouble and many wasters in the foundry.

Foundry Practice Weakness

Experience soon led to the conclusion that engineering formula, as it might be applied to cylinder design, fell far short of any reasonable requirement, not so much due to lack of application of the formula as it was to the lack of uniformity of foundry practice and to the presence of a series of variables, some of which were traced to the personal equation, others to pattern work, a few to the process in the foundry, and not a few back of the cupola—in the selection of the pig.

It was learned in time that large masses of metal in the form of ears, lugs or bosses, in integral relation to thin walls, invariably led to shrink holes, and it became practically impossible to realize a smooth bore in the process of finishing because of the imperfections which in the light of experience were directly traced to lack of uniformity of the cylinder walls. In this connection it was even considered desirable to make the waterjacket walls quite a little thicker than the pressure consideration, or foundry problem, would seem to demand. In other words, it was deemed expedient to make the cylinder and the jacket walls as nearly uniform in thickness that the ills of unequal shrinkage and expansion would be sufficiently eliminated to insure uniform product and eliminate wasters.

Charging the Cupola

Further experience led to the practice of charging the cupola and fixing the conditions in favor of a product which would show chill to at least a slight extent, and with a view to retaining a measure of the characteristic white iron over the bore of the cylinders after finishing the finish allowance was reduced to the minimum, considering inequalities in setting cores and other practical considerations. In due time, and in response to knowledge gained during the successive steps, it was determined with a fair measure of certainty that the relatively-thin, well-made cylinder castings with uniform walls were of far greater strength than the castings of earlier times, in which the cylinder walls were very thick, and a large factor in safety was supposed to reside.

Premier Marks An Advance

Gray iron, under the best possible conditions, will register a tensile strength in a testing machine of from 18,000 mimimum to 28,000 maximum pounds per square inch. The higher figure named would represent the possible results under almost ideal conditions, whereas the low level is that which engineers take as a reasonable expectation; but inferior castings almost invariably will fall below this level, and if internal strains are not equalized they

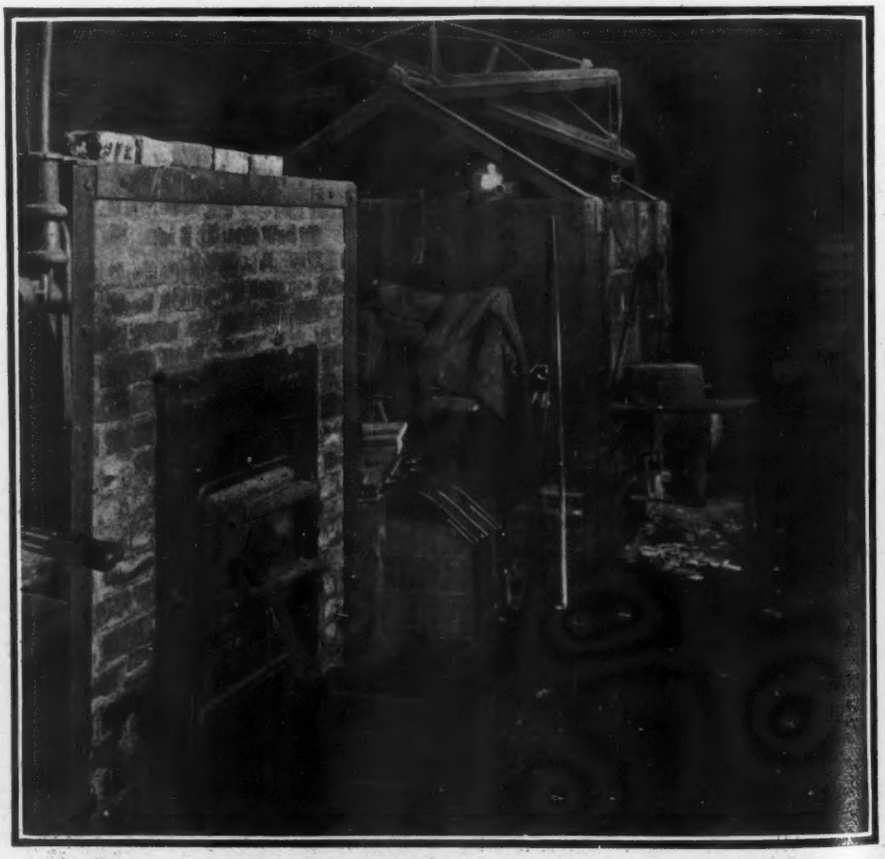


FIG. 1—PREMIER ANNEALING OVENS FOR CYLINDER CASTINGS

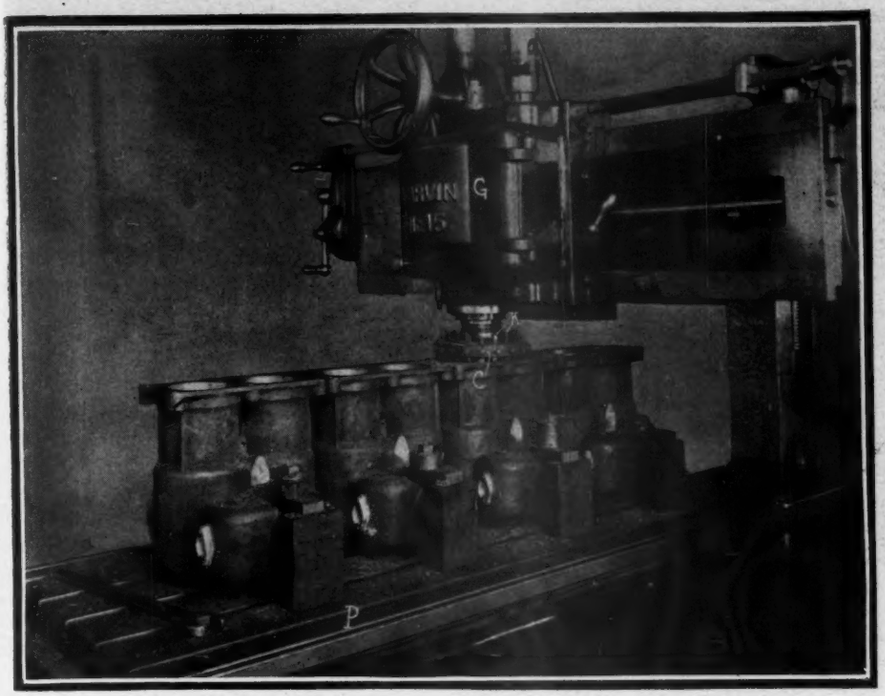


FIG. 2—MILLING ENDS OF PREMIER CYLINDERS

may equal a half or more of the strength of the castings; but whatever they are, as represented in pounds per square inch, this value must be subtracted from the initial value in order to ascertain the true ability of the castings.

It is this negative condition, together with a certain unruliness, which has been at the bottom of very many events to produce sound semi-steel castings in quantity under commercial conditions. It is this phase of the motor cylinder situation which has been taken up and wrestled with in the foundry which produces Premier cylinders, pistons and other kindred parts, so that the tensile strength instead of being a maximum at 28,000 pounds per square inch reaches up to a value which is fully 10,000 pounds per square inch higher, and the minimum value of the tensile strength which is taken as the engineering figure is well above 24,000 pounds per square inch.

The question of the internal strains must be coped with no matter what the material which is charged into the cupola may be, so that if 7 or 8 per cent of steel is utilized in the charge, for the purpose of producing a grade of semi-steel, so called, even if it does add to the working figure for the designing engineer, it is still necessary to regulate the internal strains in one way or another.

Fig. 1, which represents the cylinder annealing furnaces at the Premier plant, offers the key to success from this point of view. The cylinders are placed in the annealing ovens, and the temperature is raised to a sufficiently high point to reduce the tensile strength of the castings to a level so low that the internal strains will overcome the initial ability and a condition of equality will be realized. In this annealing process there are two prime considerations, one of which is that the temperature be raised to a sufficiently high point, and the remaining condition takes into account such a slow rate of cooling that internal strains will not be set up in the cooling process.

Milling Machines Used

After annealing the cylinders are chipped, sand-blasted and otherwise prepared for the subsequent machining process. Since boring involves the use of a special machine, this operation is delayed until the bottom flange is faced off, and the holes for the holding bolts are drilled. Fig. 2 shows a special type of Garvin milling machine in the act of facing off four pairs of cylinders, using a cathead C with inserted cutters K for the purpose. The cathead is threaded over the milling spindle and is driven by a gearbox G, which takes its power from a suitable source through a universal joint, and in setting the work the cross feed is manipulated by means of the hand wheel. The cylinders rest on the platen P, and are blocked up and clamped down in the manner shown. After the cylinders are thus faced off they are sent to a multiple-spindle drilling machine where, through the use of a suitably contrived jig, the six holding bolt holes are drilled at one time.

Referring to Fig 3, it will be observed that the boring tool, of the Davis make, mounts two pairs of cylinders C and C1 on angle plates P and P1, which in turn are bolted to the turntable T, mounted on the guides of the tool G, so that the bor-

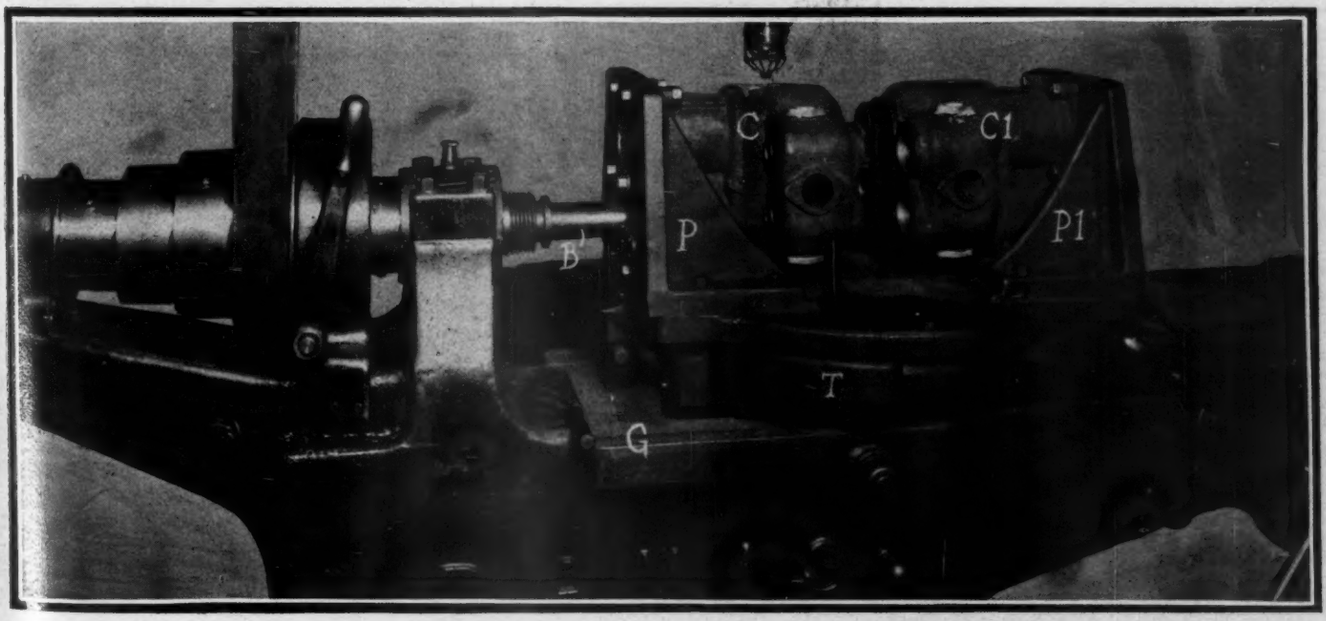


FIG. 3—DAVIS BORING TOOL WITH TWO CYLINDER CASTINGS MOUNTED THEREON

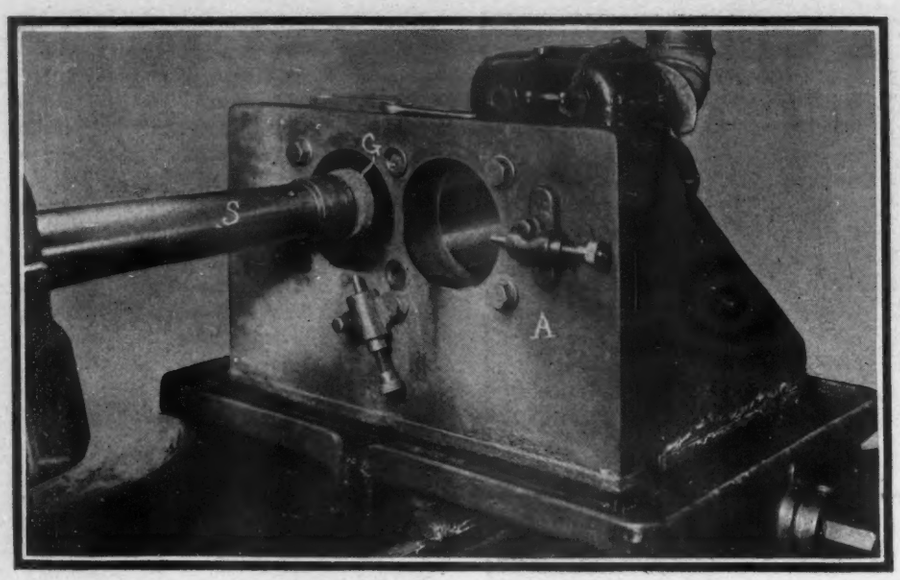


FIG. 4—HEALD ECCENTRIC GRINDER FOR CYLINDERS

ing bar B is adjusted to the proper boring relation, and the cylinder through a longitudinal feed moves up against the cutter for the required distance.

When one set of cylinders is finished, the turntable is rotated and the second set is passed through the same operation, and the workman is enabled to mount one set of cylinders while the other set is being bored. The bores are finished to within about .0001 inch, measuring the radial thickness of walls, and when this process is performed, the cylinders then are transferred to the Heald type of grinding machine, as shown in Fig. 4. The cylinders are mounted on an angle plate A, and the spindle housing S is sufficiently long so that the grinder G will be able to bottom in the cylinders when they move up against the grinder for the full distance of the bore. The grinder is mounted on its spindle on a bearing which is eccentric to the axis of rotation of the housed-in shaft, and the grinder contacts at one point only, as it rotates around the cylinder bore in response to the established eccentric relation, so that the high spots only are abraided away, and the operation is entirely at variance in important respects to that which obtains when a cutting tool is used.

Difference Is Explained

To explain the important differences it is necessary to point out that no casting, no matter how well it is made, will have a perfectly uniform density and hardness over all its surfaces, with the result that under conditions involving cutters they will dig in when they come to soft zones and chatter on the hard spots. As a matter of fact, the hard spots as they are found on the surfaces of cylinders are composed of metal which is in a condition of chill, and it is very hard indeed. The grinder eliminates all such possible trouble and produces a bore which is to unit radius, close to size, and which is not conical. The grinding process has the added advantage of doing the work rapidly when provision is made for cooling the cylinders during the grinding operation, which is but a matter of connecting the waterjacket to a source of supply, and in Premier practice there still is another refinement to be noted, the grindings are taken away as rapidly as they are formed through the vacuum pipe.

Operations Quickly Done

When the bore is completed, the cylinders are set up on a tool as shown in Fig 6. When a cylinder is clamped to the platen, a multiple-spindle tool head is so centered that the spindles S1, S2, S3 and S4 register with the four valve cover holes which occupy positions above and concentric with the valve centers. The spindles are fitted with tool holders and inserted cutters are so adjusted that the valve seats and caps are finished at a single operation. The cylinders then are taken to a valve-grinding machine, which performs the valve-grinding operation automatically and with far greater precision than is possible of attainment by the old hand-grinding process.

Fig. 7 shows the tops of a pair of cylinders and the manner in which the valve covers C are inserted and held down by yokes Y, which in turn are put into secure relation by means of a single large section holding bolt for each. Provision is made in the valve covers C1 on one side for the make-and-break timing system, the details of which are too important to be discussed excepting as a separate matter and at some length. The cover K over the waterjacket system, and which connects with the water pipe, offers a dual advantage. In the first place, with the cover removed during the operation of casting in the foundry, the gases are free to escape and the soundness of the castings is more nearly assured, and finally in service it is possible to remove these covers and clean off the exterior surfaces over the combustion chamber dome, should the occasion require. These covers are so shaped that they permit a considerable body of water to lie above the heated walls, and this is a step in the right direction.

Pistons are made of the same quality of iron as that used in the cylinders, but they are especially shaped to thwart deformation except uniformly, it being well understood that it would be futile to attempt to prevent expansion due to heat. The great question is to take into account the amount of expansion and to so regulate it that it will be spread out uniformly. Fig. 7 shows a piston in the process of grinding and concludes this series.

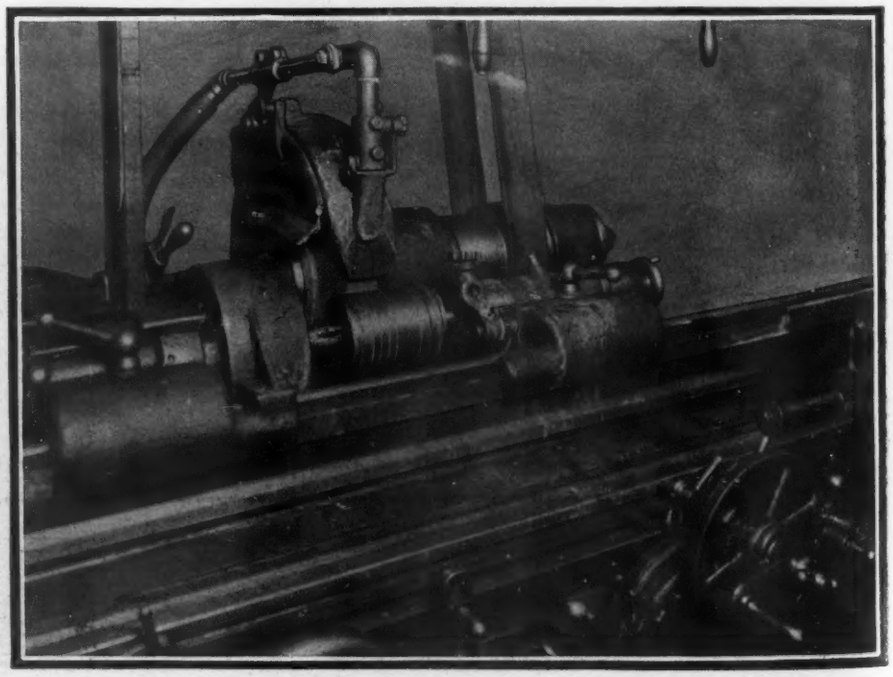


FIG. 5—GRINDING PREMIER PISTONS AT THE FACTORY

The Motorists' Bookman

"Abbott's Automobile Law for Motorists," by Twyman O. Abbott, and from the press of Reilly & Britton Co., Chicago, is a 400-page leather-covered volume in which a concise digest of motor car law is contained. The first fifty-five pages are given over to general rules relating to the use of the highway and the laws of the road, after which follows a synopsis of the different motor car laws in all the states of the union. Under the heading of General Rules, of which there are 178, come the use of the highway, what constitutes elements of danger, the rights of intoxicated persons, the laws of the road, general definitions of motor vehicles, highways, etc.; rules governing the registration of motor cars, regulations defining and referring to chauffeurs, operators, etc.; the necessity of licenses, etc. Following this, under the heading General Rules, come: Regulations for non-residents in different states; what is the car equipment permissible and the regulations therefor with special respect to tire chains, signals, lamps, brakes and muffler cut-outs; what are the rates of speeds permissible on public highways in popular centers at road intersections, at schools, and other places; what are the rules with reference to frightened horses, stopping when meeting such on signal, and giving assistance in case of accident; what the regulations are regarding the rights of garage men; what fees, fines and penalties are legitimate, and what constitutes the fundamental principles of the motor law governing negligence of the operator of the car. The synopsis of the laws in the different states covers such matters as registration, speed laws, regulations governing brakes, and mufflers, regulations with relation to meeting horse-drawn vehicles, and fines and penalties for violations of the law. There are thirteen pages of the California law as passed in March, 1905, and amended in 1907 and 1909. The book shows that there is no general motor vehicle law in Arizona, Arkansas, Colorado, Georgia, Idaho, Louisiana, Nevada, New Mexico, Oklahoma and Wyoming. To the motorist who expects to tour during the coming season to different states the book is a most valuable one and must be considered a compilation of the various motor statutes rather than a legal dissertation on the laws of the day.

"Self-Propelled Vehicles," by James E. Homans, has been issued in revised form for 1910 by Theo. Audel & Co., New York. The book has been brought up to date by the addition of considerable valuable information and now appears in 650-page, cloth-covered volume. The history of the motor vehicle is continued, after which the makeup of the motor car is given, containing as it does a chapter on differential or compensating mechanism, other chapters on chains and shaft-drive systems, steering mechanisms, chassis constructions, including springs, with rules for calculating spring design. Following is an analysis of the wheel and tire situation, with chapters on the troubles of tires with remedies. The analysis of the motor car continues in incorporating as it does cooling systems, carburation, ignition, transmission systems, and motor operation. Departments are devoted to steam cars, storage batteries. The illustrations are, in the majority of cases, taken from American constructions of today.

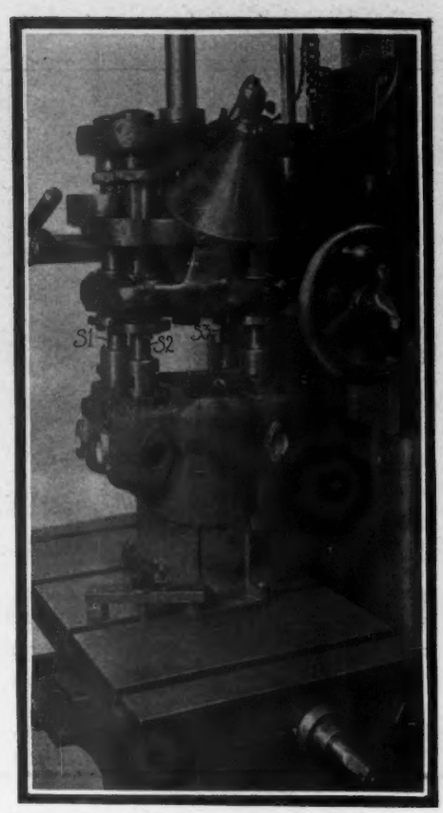


FIG. 6—PREMIER MULTIPLE-SPINDLE DRILL

"Automobile Troubles and How to Remedy Them," by Charles P. Root, and published by Charles C. Thompson Co., Chicago, contains 220 pages of information on car troubles. Twenty pages are devoted to a chart giving symptoms of troubles and the causes. Following this the various troubles are treated separately, following the general scheme as may be explained in one example: "Back Firing —Symptoms. When starting the engine it rotates in the opposite direction to that in which it revolves and causes starting handle to be violently thrown back, which possibly causes injury to the operator. Explosions in the exhaust are sometimes known as back firing. Causes: Wrong timing of the ignition, preignition due to incandenscent carbon deposit, overheating due to failure of some part of the cooling apparatus, mis-firing, switching off before throttling off."

Of interest to motorists, and to Chicagoans in particular, is the official guide book issued by the Chicago Automobile Club, which contains routes galore radiating from the Windy City, as well as routes extending from the Atlantic to the Pacific, and from the Gulf of Mexico to the Canadian border line. Comprehensive maps, together with a digest of the state laws.

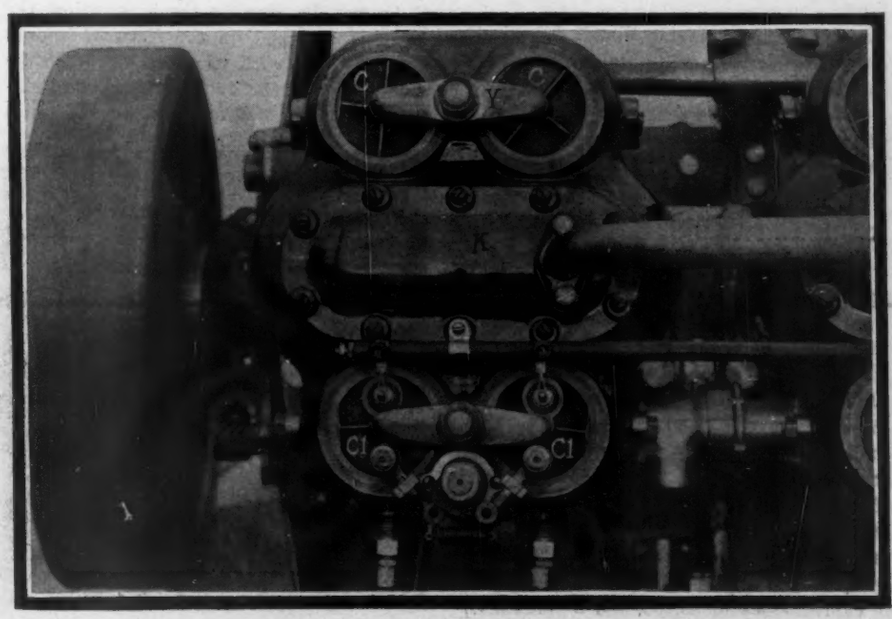
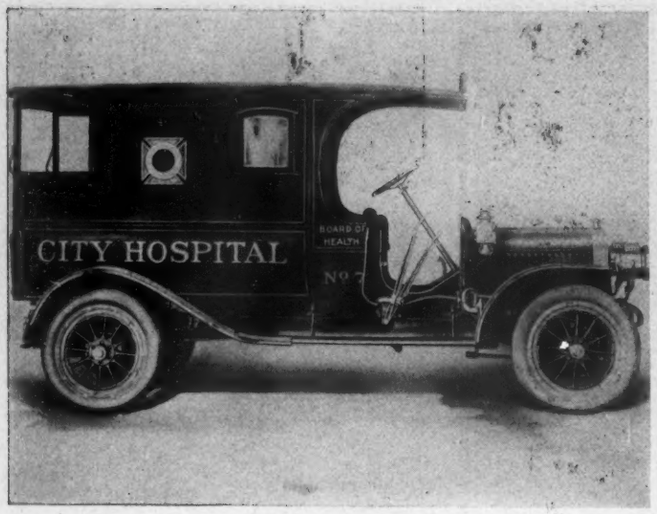


FIG. 7—TOP OF PREMIER CYLINDER HEAD SHOWING DESIGN



MAXWELL AMBULANCE OWNED BY NEWARK, N. J.

PIERCE-ARROW, 1906 MODEL, CONVERTED INTO DELIVERY WAGON

In the Realm of the Commercial Car

THE board of health of the city of Newark, N. J., for which the Maxwell-Briscoe Motor Co. built an ambulance a year ago, has just received a second vehicle of the same make which shows a number of interesting details. The wheelbase is 127 inches and the length of the body 6 feet 7 inches inside from front partition to tail gate. The width of the body is 40 inches at the bottom and 44¾ inches at the top. There are two drop windows in the front partition and two stationary windows on either side in front. The body frame is of mahogany. The bed for the patient is 6 feet 4 inches by 3 feet 2 inches and is made up on an ash frame 4¾ inches deep, upholstered in black leather,, the inside of the bed being padded up to a point 18½ inches from the floor; the pads themselves are removable, for easier cleaning. Convenient use of the bed is procured by having it run on tracks. Besides the physician's seat, which extends across the rear of the body, there is an emergency seat on the left rear side and a mahogany medicine case at the front partition. Inside illumination is by two electric corner lights and a megaphone speaking tube affords a means of communication between the physician and driver. The motor ambulance is shod with Ajax tires on Fisk demountable rims and also has shock absorbers.

TAXICAB FAILURE IN CHICAGO

The Chicago Taxicab Co., one of the big concerns running a fleet of cabs in the Windy City, at the head of which is Alderman A. B. McCoid, was placed in the hands of a receiver last Monday by Judge Walker in the circuit court. The application for a receiver was filed by Harold E. Leopold, who claims the company owes him $1,538.74. The bill was filed following a meeting of the Chicago Taxicab Co., at which was passed a resolution agreeing to discontinue business. The company was incorporated April 17, 1907, with a capital stock of $5,000, and 2 years later this capital stock had increased to $2,000,000. Three months following this it was claimed the capital had decreased to $500,000. It is said that there is now outstanding 3,883 shares of preferred stock of the face value of $100 a share.

IN FLORIST'S SERVICE

Fleischman, the Chicago florist, has in his service a motor delivery wagon with a unique body construction which already has proven its worth. The chassis is a Stoddard-Dayton and despite the heavy snows of the past winter, which have made Chicago streets all but impassable, the car has rendered a steady service. It has been anticipated that because of the heavy top on the body trouble might be experienced in navigating Chicago's poor city streets, but evidently this has not been the case, for the florist announces his intention of adding one or two more Stoddard-Daytons to his fleet this spring.

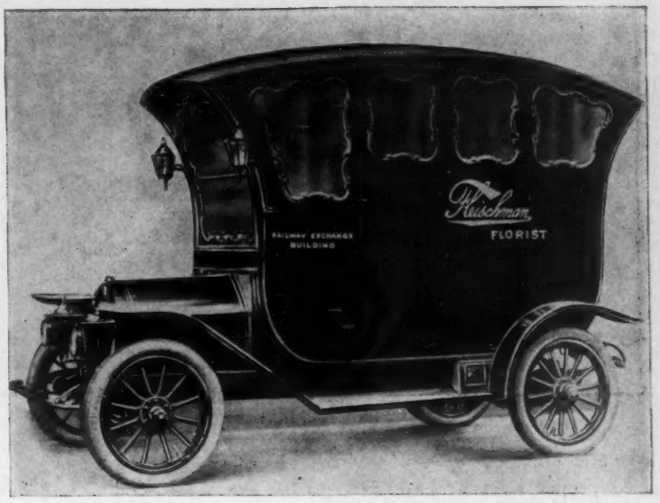
As may be seen by the illustration, the body is designed on the lines of an old French coach with windows of rococo design with French beveled glass. The lighting equipment follows the same general lines, electricity being used. The interior is lighted by three ceiling lamps, while the body has a false bottom with compartments in which batteries, tools and other equipments are carried, leaving the running board clear. The interior of the car is fitted with shelves for the carrying of stock and provision is made for heating the car in order to protect the flowers in cold weather. The driver's seat is enclosed; the color of the car is violet and the interior is mahogany finish. The machine has been in operation now for the last 90 days and has traveled 2,100 miles in that time. The fuel consumption has totaled 270 gallons, but this may be explained by the heavy going that has prevailed because of the storms of the present winter. Mr. Fleischman declares that the car so far has proved less expensive than a horse-drawn rig, and claims that it can do the work of three horses.

MAKING OVER OLD CARS

While the term commercial vehicle generally is understood to include only those motor cars and trucks that are designed

GARFORD TRUCK IN SERVICE OF HUEBN BREWERY CO. OF TOLEDO

FRANKLIN USED IN NEWBURGH, N. Y.



STODDARD-DAYTON RUNNING FOR CHICAGO FLORIST

Business Wagons Are Making Good

especially for commercial work, there is a phase of this particular branch of the motor car industry that deserves some attention. This is the making over of high-grade touring cars into delivery wagons for special service. This method has been adopted by several firms in Buffalo, N. Y., and the cars have now been in use a sufficient length of time to demonstrate thoroughly their efficiency for this class of work. Generally a touring car 2 or 3, sometimes 4, years of age is used, the original body is removed and special box body put in its place. There are now half a dozen Pierce-Arrow cars of 1906 make doing daily service in Buffalo, and the indications are that this number will be a small percentage of the number in service by the end of another year. By this method the purchaser secures at comparatively low cost a car that may be lacking in some of the refinements of the present day models, but which, owing to the character of its work, never will be called on to do what the new long distance touring car must accomplish. It has speed far beyond the ordinary motor delivery wagon and also greater power. So much has this plan for securing delivery cars for quick service appealed to Buffalo merchants that a number of those that would have hesitated to take the first step in this direction have been so affected by the results obtained that they are seriously considering giving this method a trial. It has appealed to a number of heads of business houses, too, as a way of disposing of an old model car when they buy a new one. Now they can turn their old car in to the company in which they are interested for delivery purposes and buy the new one outright.

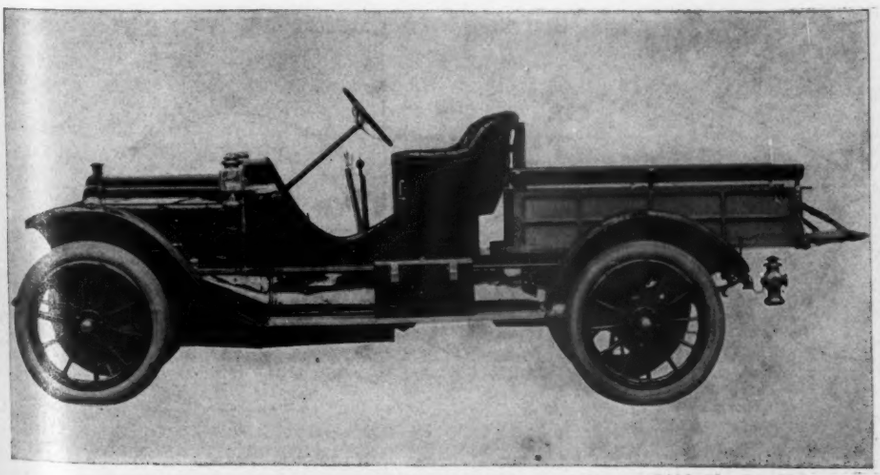
CRITICIZES CHICAGO METHODS

The failure in Chicago this week of one of the big taxicab concerns has aroused comment from a New Yorker who is familiar with the business and who draws comparisons unfavorable to Chicago methods as contrasted to the way they do it in New York. In the Windy City it is the custom of some of the big concerns to run their machines in double shifts, which means 24 hours' work a day for each cab. While this undoubtedly is a money-maker, still the easterner thinks the Chicagoans are burning the candle at both ends in doing this.

"I have had considerable experience in the taxicab business in my time," said this easterner, "and I was surprised to learn that Chicago uses the double shift. In doing this the depreciation on stock is something frightful, for a taxicab is called upon to do work that even a powerful steam locomotive would balk at. It is the railroad practice to run a locomotive 150 miles and then put it in the roundhouse for a day or so, where expert machinists go over it, examine it carefully and make whatever repairs are needed. In this way the engine gets a needed rest and always is tuned up for its work. With the taxicab it is different. The Chicago machine is on the go constantly, there is no let-up or roundhouse examination for it, and I venture to say that some of these little machines run as much as 700 miles a week. Surely one cannot expect a motor car to last long under such a hammering."

WHITE DOMESTIC EXPRESS

A real innovation in body building is the domestic express which has just been brought out by the White Co. As the name implies, this body is designed to take care of the various odd jobs of moving and delivering which come up from time to time in connection with the home. There always has been a demand for some convenient means of getting two or three trunks to the station, moving goods between the city house and the country house, etc.; but the needs of this service are only occasional and do not justify the purchase of a separate machine. The White company offers as a solution of the problem the domestic express body, to be used in connection with its gasoline toy tonneau. The toy tonneau is detachable and, when removed, the domestic express body slips on in its place, as shown in the accompanying illustration. The change from toy tonneau to domestic express, or vice versa, is made in a few minutes.



WHITE FITTED WITH DOMESTIC EXPRESS BODY

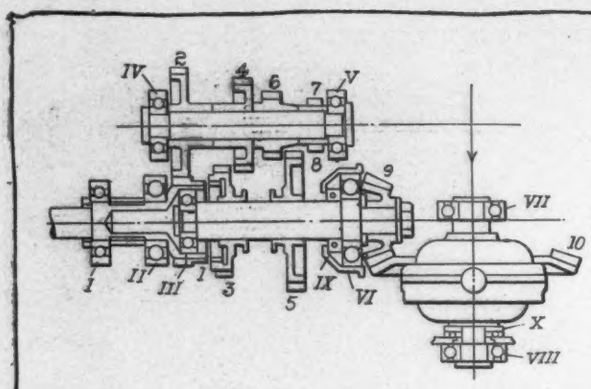


FIG. 1

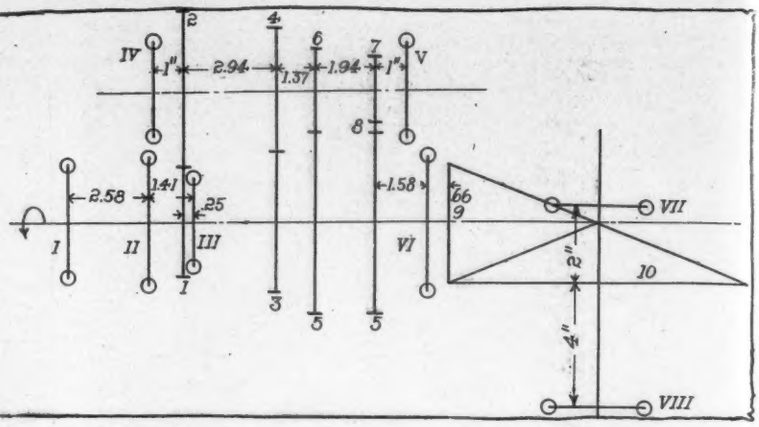


FIG. 3

Selection of the Proper Sizes of

Editor's Note — The following paper was read at the semi-annual meeting of the Society of Automobile Engineers, New York City, January 4 and 13, 1910, by L. C. Freeman:

THE question of the selection of the proper sizes of ball-bearings for any given set of conditions is one that should properly receive the consideration of those most expert in their design and application. However, in change-speed gear design, where the ratio between the diameters of the bearings and the diameters of the gears is small, the sizes of the bearings have so great an influence on the center distance of the shafts and the shape and outline of the casings that a change in the bearings from those originally laid out frequently necessitates the redesigning of the whole job.

Factors to Consider

This analysis is presented with the idea in view of determining the most important factor to be considered in the selections of the bearings, viz., the maximum loads imposed on them by the action of the gears. This will be found, as has been found in actual practice, to call for bearings of such size that a consideration of the other factors will not change them to an extent sufficient to cause a rearrangement of the entire mechanism. The other principal factors to be considered are the effects of unbalanced rotating parts, of brakes and sprags, of universal joints, of variations in the loads and the period of these variations. The latter will usually be found to permit a certain per cent overload on reverse, sometimes 75 per cent or over, due to its infrequent use. The assumption then on which this analysis is based is that there are no forces acting on the bearings except those due to the gear pitch line loads. The data required is the maximum turning moment, the diameter of the driving wheels, the load on the rear axle and the maximum coefficient of friction between the tires and the ground. The method can best be illustrated by assuming the data and working out an actual example.

The motor develops 40 horsepower at 1,000 revolutions per minute. Spur gears, 6-8 pitch, have a pressure angle of 20 degrees, and there are bevel gears, 5 pitch, with 14½ degrees pressure angle. The pressure on the bevels is assumed to act on the largest pitch diameter. The arrangement of gears and numbers of teeth are shown in Fig. 1. Center distance of shafts, 4½.

Gear 1—20 teeth, 6-8 pitch. 3.333 pitch diam.
Gear 2—34 teeth, 6-8 pitch. 5.666 pitch diam.
Gear 3—28 teeth, 6-8 pitch. 4.666 pitch diam.
Gear 4—26 teeth, 6-8 pitch. 4.333 pitch diam.
Gear 5—36 teeth, 6-8 pitch. 6.000 pitch diam.
Gear 6—18 teeth, 6-8 pitch. 3.000 pitch diam.
Gear 7—15 teeth, 6-8 pitch. 2.500 pitch diam.
Gear 8—18 teeth, 6-8 pitch. 3.000 pitch diam.
Gear 9—20 teeth, 5 pitch. 4.000 pitch diam.
Gear 10—60 teeth, 5 pitch. 12.000 pitch diam.

Thirty-four-inch driving wheels with 2,500 pounds on the rear axle.

Sixty per cent maximum coefficient of friction between the tires and the ground.

Maximum turning moment is

Where N = revolutions per minute;
r = radius of gear in inches;
p = tangential pressure on pitch line.

$$\frac{\text{Horsepower} \times 33{,}000 \times 12}{N \times 2\eta} = pr.$$

That is

$$\frac{40 \times 33{,}000 \times 12}{1{,}000 \times 2\eta} = 2{,}250 \text{ inch-pounds.}$$

Pressure at the largest pitch diameter of bevels necessary to slip wheels is

$$= \frac{2{,}500 \times .60 \times 17}{6} = 4{,}250 \text{ pounds}$$

= maximum pitch line load on bevels.

This maximum pitch line load on bevels is equivalent to a turning moment on the pinion shaft of

4,250 × 2 = 8,500 inch-pounds.

Pitch line load on constant mesh gears is

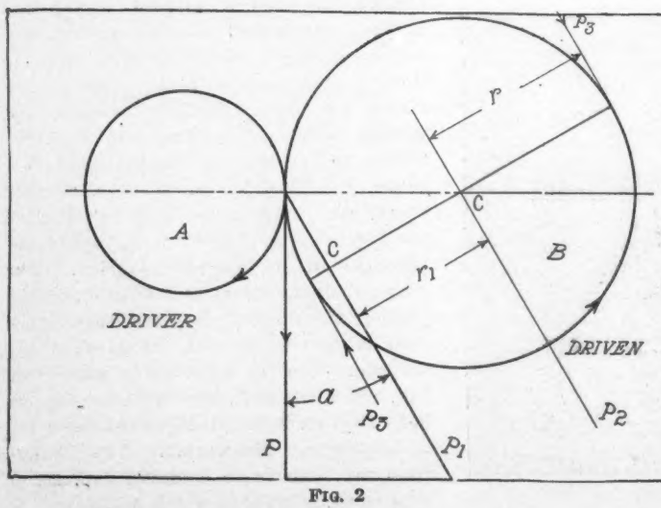


FIG. 2

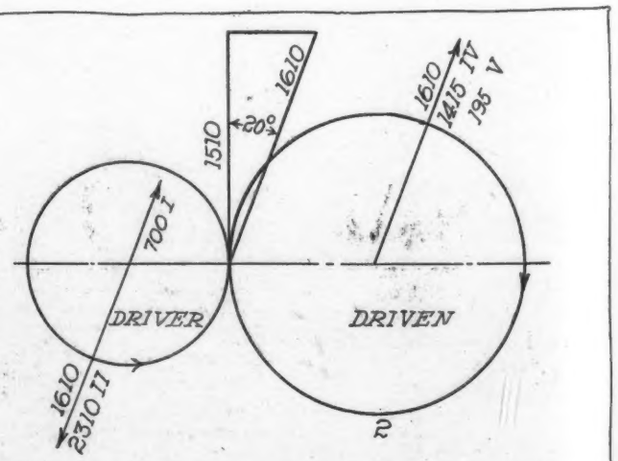


FIG. 4

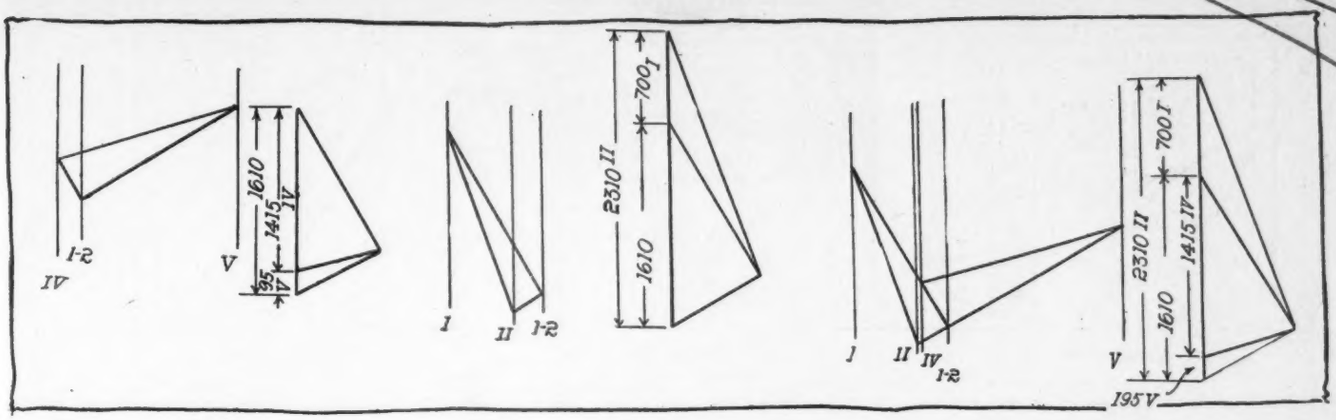


FIG. 5 FIG. 6 FIG. 7

Ball Bearings For Motor Car Use

$\frac{2,250}{1.666} = 1,510$ pounds—gears 1 and 2—[2,520 inch-pounds.

Pitch line load on second-speed gears is $\frac{1,510 \times 34}{26} = 1,970$ pounds—gears 3 and 4 [—4,600 inch-pounds.

Pitch line load on first-speed gears is $\frac{1,510 \times 34}{18} = 2,850$ pounds—gears 5 and 6 [—8,550 inch-pounds.

Pitch line load on reverse gears is $\frac{1,510 \times 34}{15} = 3,420$ pounds—gears, 5, 7 [and 8—10,250 inch-pounds.

Only 8,500 inch-pounds is the maximum turning moment that can be applied to the pinion shaft without slipping the wheels. It will be seen that this is slightly less than that due on the first speed gear, and that the full power of the motor cannot be transmitted on reverse.

The pressure on the bearings of a pair of gears is equal to the pitch line tangential pressure multiplied by the secant of the pressure angle of the tooth, and the sum of the loads on the bearings of one gear is equal to the sum of the loads on the bearings of the other. That this is true may be seen by reference to Fig. 2.

A is the driver, B the driven gear, P the force acting tangent to the pitch circle, P_1 the pressure along the line of action, α the pressure angle, P_2 the pressure on the bearings parallel to P_1, and the forces P_3 form the resisting couple.

The moment of P about O equals the moment of P_1 about O.

$P_1 = P \sec \alpha \quad \frac{r}{r_1} = \frac{P_1}{P} \quad Pr = P_1 r_1$

$r = r_1 \sec \alpha$

The turning moment must be equal to the resisting moment, or $Pr = P_1 r_1 = 2 P_3 r$. 1—Taking moments about c,

$$\frac{P_3 (r + r_1) + P_3 (r - r_1)}{r_1} = P_2$$

$\frac{2 P_3 r}{r_1} = P_2$ from (1) $\frac{2 P_3 r}{r_1} = P_1 \therefore P^1 = P_2$

Similarly for gear A.

Fig. 3 is a skeleton diagram of Fig. 1, giving the distances between the centers of the gear pairs and bearings. All end views are taken in the direction of the arrows.

Lay off end views of the pitch circles of the gear pairs showing direction of rotation as in Fig. 4, which represents the constant mesh gears 1 and 2. Normal to the center line lay off the pitch line tangential pressure to scale, and consider it as one of two components of the pressure along the line of action, the other being parallel to the center line of the gear pairs.

This pressure along the line of action is equal to the sum of the pressures on the bearings of gear 2 and to the sum of the pressures on the bearings of gear 1, and for each shaft must be resolved into two parallel components acting at the centers of the bearings. These will be inversely proportional to the distances from the centers of the bearings to the centers of the gear faces.

The graphical method of finding these components is exactly the same as that for finding the reactions of the supports of a beam with a concentrated load. The solution for gear 2 is shown in Fig. 5, where the pressure on bearing IV is found to be 1,415 pounds and on bearing V 195 pounds.

Solving Bearing Pressure

In Fig. 6, the solution for gear I, it will be noticed that the pressure on bearing II is equal to the sum of the pressure on bearing I and the pressure on the line of action of gear I; that the pressure on bearing I acts in the opposite direction from that on bearing II, and that there is no pressure on bearing III from this gear pair.

These bearing pressures then are transferred to the end views of the gear pairs as in Fig. 4, thus determining their direction. Fig. 4 then shows the magnitude and direction of the pressures on all the bearings affected by the action of gears 1 and 2. Figs. 5 and 6 may be combined as in Fig. 7, thus reducing the number of measurements to be made.

Figs. 8 and 9 are the end views of gear pairs 3 and 4 and 5 and 6, respectively. Figs. 10 and 11 are the end views of gears 5, 7 and 8, Fig. 10 showing the reverse idler above the other two gears, and Fig. 11 shows it below. If, because of structural difficulties, the reverse can be placed in but one of these positions, the other, of course, will not be considered.

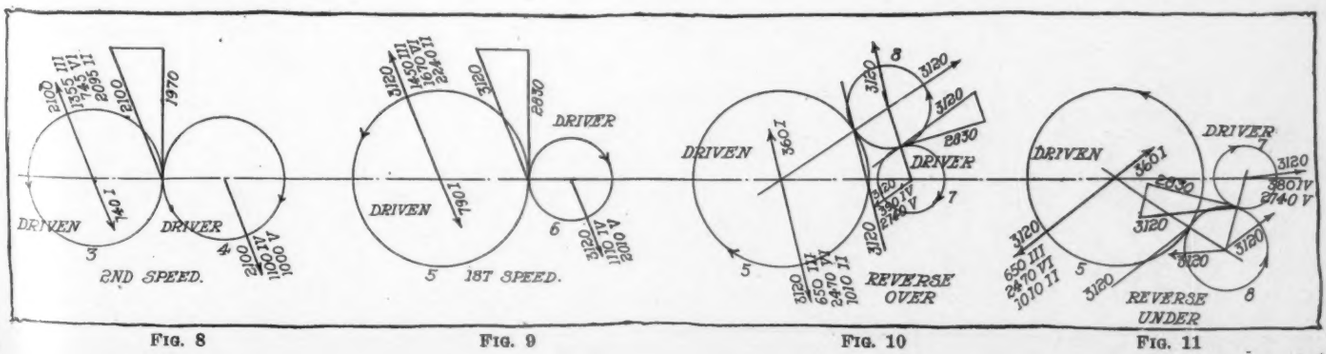


FIG. 8 FIG. 9 FIG. 10 FIG. 11

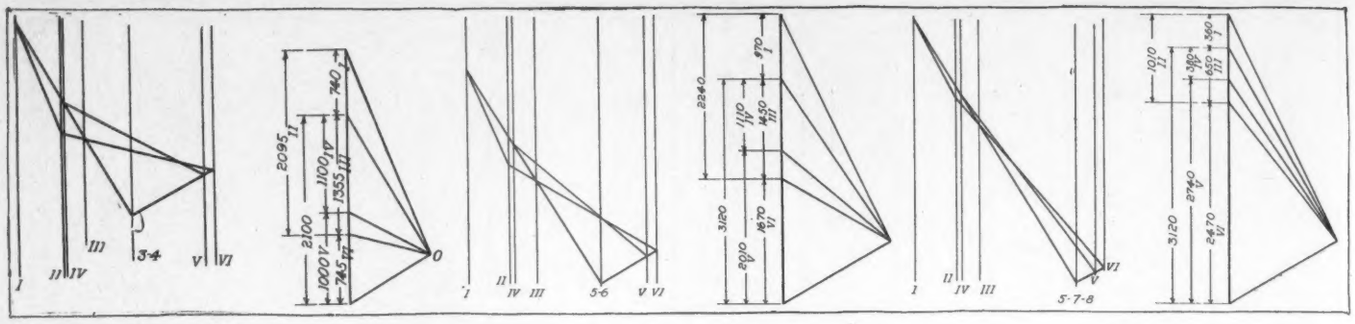


FIG. 12 FIG. 13 FIG. 14

It will be noticed that the pitch line load on the first speed and reverse gears in Figs. 9, 10 and 11 is taken as 2,830 pounds instead of 2,850 pounds for the first speed, and 3,420 pounds for the reverse, which we found by figuring from the motor torque. However, we have seen that 8,500 inch-pounds is the maximum turning moment that can be applied to the pinion shaft without slipping the wheels. The radius of gear 6 is 3 inches and

$$\frac{8{,}500}{3} = 2{,}830 \text{ pounds,}$$

which is the maximum pitch line load on gear 6.

Although the pitch line loads on the first speed and reverse gears are the same, the point of application of the load is in a different plane, and so it is necessary to construct the equilibrium and vector diagrams for each case. The bearing load distribution is the same for Fig. 11 as for Fig. 10, the only difference between the two cases being in the direction of the pressures.

Fig. 12 is the load distribution diagram of Fig. 8. The pressure on the line of action, 2,100 pounds, is resolved into the two parallel components 1,100 and 1,000 pounds acting on bearings IV and V respectively, and also into the components of 1,355 pounds and 745 pounds acting respectively on bearings III and VI. The load of 1,355 pounds on III is then resolved into loads of 740 pounds on I and 2,095 pounds on II.

Figs. 13 and 14 are the load distribution diagrams for first speed and reverse, respectively.

The general equation for thrust on a bevel gear pair is:

$T = P \tan \alpha \sin \beta$ where

T = thrust.

P = tangential pressure on pitch line.

α = pressure angle.

β = pitch angle of gear.

The equation for radial load is:

$L = \sqrt{P^2 + (P \tan \alpha \cos \beta)^2}$

where L = radial load.

These mathematical expressions do not show the direction of the forces acting, and as these have to be taken into consideration, the graphical method which gives a complete solution is used. This is in fact the principal reason for the use of the graphical method throughout this analysis.

Notation for Fig. 15:

A = Driving pinion.

B = Driven gear.

α = Pressure angle.

β_1 = Pitch angle of gear.

β = Pitch angle of pinion.

P = Tangential pressure on pitch line.

P_1 = Pressure on line of action.

P_2 = Thrust component of P_1.

P_3 = Pinion thrust.

P_4 = Gear thrust.

P_5 = Pinion radial component of P_2.

—— 1,510 pounds—gears 1 and 2—2,520 inch-pounds.

P_6 = Gear radial component of P_2.

P_7 = Pinion radial load.

P_8 = Gear radial load.

The black arrows indicate forces acting on the gear, and the light arrows the forces acting on the pinion. If the three large triangles, P, P_1, P_2; P, P_7, P_8, and P, P_8, P_6, were revolved downwardly about their shortest sides as an axis until in planes at right angles to the paper, they would represent the magnitude and direction of the forces acting in these planes or in parallel planes. The triangles P_2, P_3, P_4 and P_2, P_5, P_6 represent the magnitude and direction of the forces acting in the plane of the paper.

P is laid off on the common element of the two pitch cones, P_1 on the line of pressure and P_2 drawn normally to P precisely as for spur gears.

Care must be taken in determining on which side of P P_1 shall lie. This point is brought out more clearly by reference to the analogous spur gear diagrams in Fig. 16, in which it is seen that for the four cases the line of pressure has but two possible inclinations.

P_2 is then resolved into two components, P_3 acting axially and P_5 radially on the pinion, and also into P_4 acting axially, and P_6 radially on the gear. Then the radial loads on the gear are P_6 acting in the plane of the paper and P acting vertically to the plane of the paper, and their resultant is P_8. Similarly the resultant of P_5 and P is P_7. These radial loads are then transferred to the end views of the gears as shown.

Careful attention should be paid to the direction of the forces and reactions, remembering that the direction of the resultant must be opposite to that of its com-

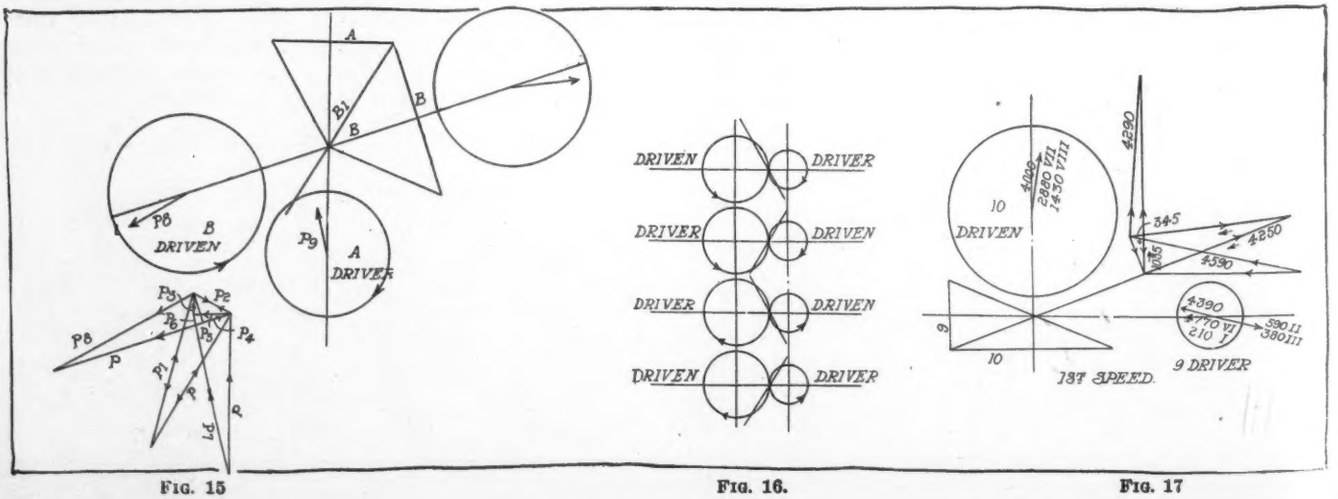


FIG. 15 FIG. 16. FIG. 17

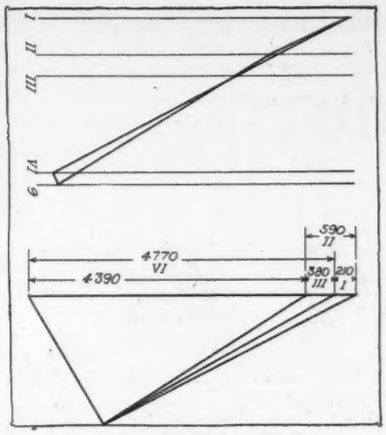


FIG. 18

$$1{,}970 \times \frac{4{,}666}{4} = 2{,}300 \text{ pounds}$$

and on direct is equal to the turning moment of the motor divided by the radius of gear 9.

$$\frac{2{,}520}{2} = 1{,}260 \text{ pounds}$$

The bearing pressures due to the action of the bevels are proportioned to the bevel gear pitch line tangential pressure, and as the forces act in the same direction they can be calculated and plotted from Fig. 17.

Fig. 20 shows pressure thus obtained for VII and VIII, on second speed, and Fig. 21, the same bearings on direct. Figs. 22 and 23 show the loads on bearings, I, II, III, VI, for second speed and direct respectively.

The load distribution is quantitatively the same for reverse as for first speed, but as the direction of the forces are different, a new diagram must be made for this case, as in Fig. 24.

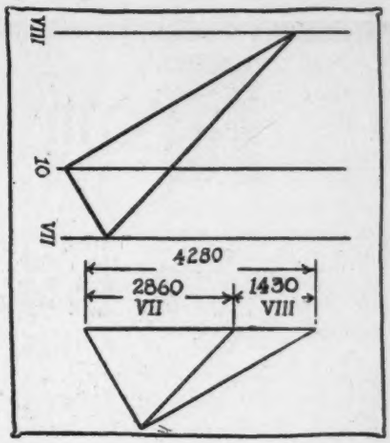


FIG. 19

ponents, and that the end view of the gears must be drawn on the same side as the force diagram. Thus, if the end of gear B was drawn on the opposite side—shown by the dotted lines—of the gear, the resultant radial load could not be directly transferred from the force diagram, but would have the apparent direction shown.

If in Fig. 15 the angle between the shafts become 90 degrees,

$\beta + \beta^1 = 90$ degrees.

$P_3 = P_6$.

$P_4 = P_5$, as in Fig. 17,

while if the shafts are parallel

$\beta = \beta^1 = 0$.

$P_2 = P_5 = P_6$.

$P_3 = P_4 = 0$.

$P_1 = P_7 = P_8$,

which will be seen to be identical with the spur gear diagrams, in which the thrust is 0 and the radial load on both gears equals P_1.

We have seen that 4,250 pounds is the maximum pitch line load on the bevels, so that in Fig. 17 P equals 4,250 pounds and the radial and thrust loads are found to be as follows:

Pinion radial, 4,390 pounds.

Pinion thrust, 345 pounds.

Gear radial, 4,290 pounds.

Gear thrust, 1,035 pounds.

The load distribution on the bearings is shown in Fig. 18 for I, II, III, VI, and in Fig. 19, for VII, VIII.

The maximum pitch line load of 4,250 pounds on the bevels occurs only on first speed and reverse. This pressure, on second speed, is equal to the tangential pressure on gear 3 times the ratio of the diam eter of gear 3 to the diameter of gear 9.

RAILROADS CHANGE RULE

New York, Feb. 28—J. S. Marvin, general traffic manager of the National Association of Automobile Manufacturers, has announced a change in the rules of railroads which will simplify matters considerably in securing cars at the factories for motor car shipments. Many factories require freight cars no longer than 36 feet for their shipments, but the railroads frequently supply 40-foot cars, the charge for which is considerably more than for 36-foot cars. Rather than wait indefinitely for 36-foot cars, the factories, to effect prompt deliveries, have used 40-foot cars in such cases. The new ruling will become effective April 1, 1910, and provides that when the factories order 36-foot cars and the railroad is unable to furnish cars of that length, but furnishes instead 40-foot cars, the freight charges shall be computed on the 36-foot car basis. Naturally this will only apply when the machines loaded into the 40-foot cars are of such length that they could actually have gone into a 36-foot car, and this is a point that the railroads will watch very closely; any abuse of the new rule through misrepresentation will result in its withdrawal.

Mr. Marvin has just returned from a trip which covered traffic meetings and conferences at Detroit, Chicago and New Orleans, in relation to the transportation and rating of motor cars. He reports the freight car situation in Michigan, Ohio and Indiana, where there has been a serious shortage, as much improved by the appearance from car shops of hundreds of new cars ordered some time ago by the New York Central lines, Pennsylvania system, Wabash, C. and N.-W., C., M. and St. P., Santa Fe, Union Pacific and other railroads. These cars are the railroads' standard box cars except that they have the double doors recommended by the traffic department, making them available for motor car shipments. In one lot alone there are 5,000 such cars coming through the shops for the New York Central lines. Much of the difficulty experienced by factories in getting freight cars for their shipments is due to the slow return of these cars when loaded to distant points. When made empty they should be loaded back to the roads owning them, but instead of doing this the freight agents frequently put them into local service.

Mr. Marvin urges that dealers in the west and south interest themselves in this and agitate it with the local freight agents of railroads handling their shipments, as it would help the situation and do much toward effecting prompt deliveries of motor cars from the factories.

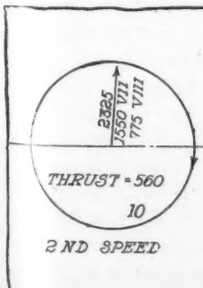


FIG. 20

FIG. 21

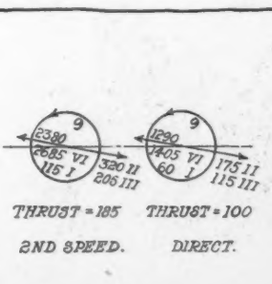


FIG. 22

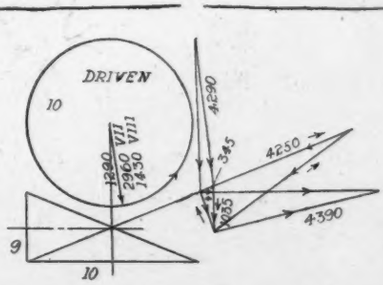


FIG. 23

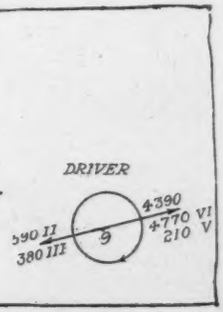


FIG. 24

From the Four Winds

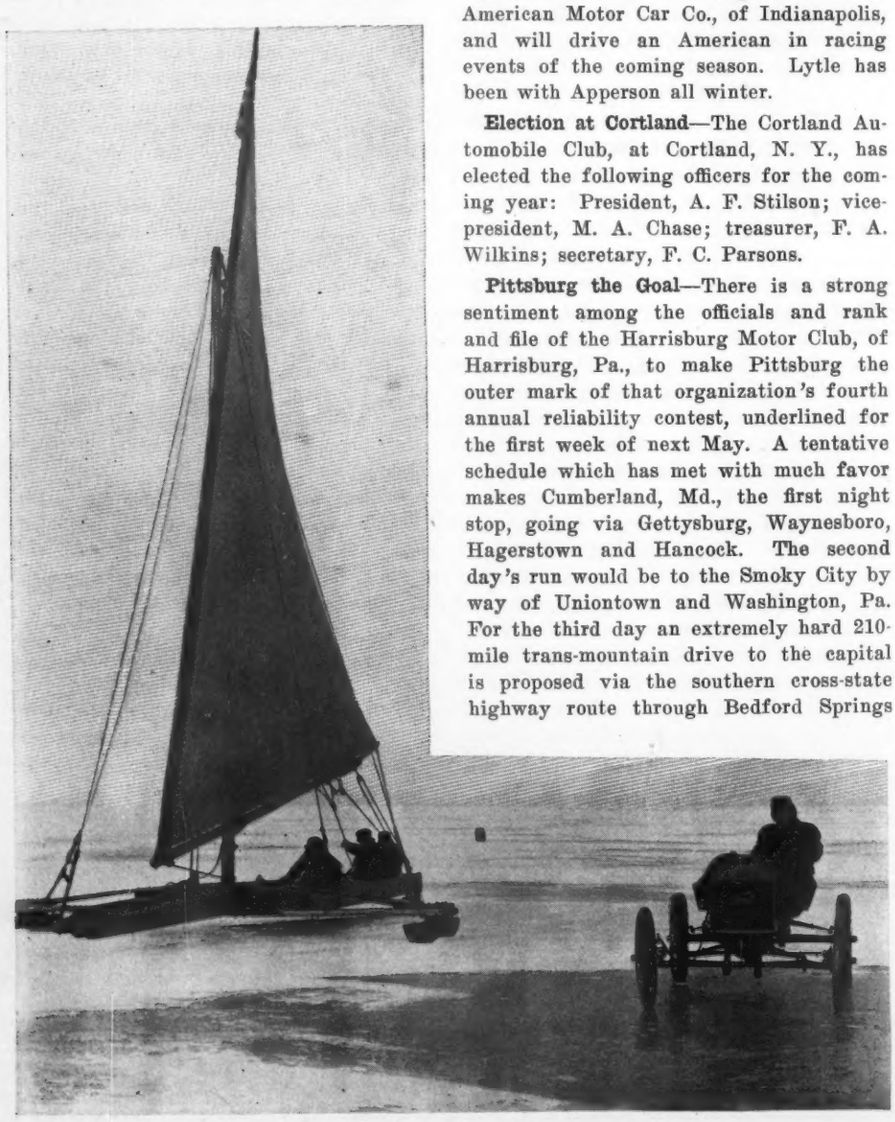
CARS LINE UP ON NEW 1-MILE CIRCULAR BOARD TRACK AT LOS ANGELES

Interesting Talks—Through the efforts of Indianapolis manufacturers of motor cars and parts, the motor class of the Young Men's Christian Association in that city has grown to a membership of 150. On the evening of February 24, Albert Glidewell, of the Nordyke & Marmon Co., gave an interesting lecture on magneto ignition, while on February 21 Frederick B. Hart, of the Excelsior Supply Co., Chicago, gave a lecture on motor cycles and motor cycle motors.

Lytle Will Drive American—Herbert Lytle has joined the racing team of the American Motor Car Co., of Indianapolis, and will drive an American in racing events of the coming season. Lytle has been with Apperson all winter.

Election at Cortland—The Cortland Automobile Club, at Cortland, N. Y., has elected the following officers for the coming year: President, A. F. Stilson; vice-president, M. A. Chase; treasurer, F. A. Wilkins; secretary, F. C. Parsons.

Pittsburg the Goal—There is a strong sentiment among the officials and rank and file of the Harrisburg Motor Club, of Harrisburg, Pa., to make Pittsburg the outer mark of that organization's fourth annual reliability contest, underlined for the first week of next May. A tentative schedule which has met with much favor makes Cumberland, Md., the first night stop, going via Gettysburg, Waynesboro, Hagerstown and Hancock. The second day's run would be to the Smoky City by way of Uniontown and Washington, Pa. For the third day an extremely hard 210-mile trans-mountain drive to the capital is proposed via the southern cross-state highway route through Bedford Springs and Chambersburg, though some prefer the more northerly route via Johnstown, Altoona and Lewistown. Already ten entries are assured from manufacturers, of which five already have been filed.



KULICK IN FORD RACES ICE BOAT ON LAKE ST. CLAIR, MICHIGAN

Roadability Plans Made—The committee in charge of the third annual roadability run of the Quaker City Motor Club to Atlantic City on April 30, May 1 and 2, has secured the co-operation of the officials and board of trade of the City-by-the-Sea, Mayor Stoy having agreed to officially welcome the travelers and to name the secret time for the commercial contingent, Mayor Reyburn having obligated himself to set the time standard for the pleasure-car class. Arrangements for the 2-day show for the participating cars on the million-dollar pier are well under way, this end of the affair being under the direct management of the Philadelphia Automobile Trade Association.

Racing on Lake St. Clair—Testers connected with Detroit plants enjoy the winter weather racing on Lake St. Clair. Recently Frank Kulick, in a Ford, beat an ice boat in a race and almost every day there is some sort of a contest. The Chalmers plant is situated on the shore of the Detroit river about 3 miles below Lake St. Clair, and races between testers and between motor car and ice boat make the tester's task a thrilling one. The ice yachtsmen are very boastful of the speed they attain with their craft; 50, 60 and even 70 miles an hour they claim with the utmost nonchalance. And so it is the delight of the Chalmers testers to take a 30 chassis on the ice and beat out the fastest of the boats. Between dodging the ice craft and bounding over hummocks on the ice, the cars get as much jolting in 25 miles of ice speeding as they do in an entire season of ordinary use. Fancy skidding is one of the tester's ice stunts. Those who know skidding only as they have seen it on the asphalt pavements or on a race course have a great deal to learn about what a skid really is. On the ice the Chalmers testers attain a speed of

about 40 miles an hour, and then suddenly start to coast with brakes set. It is not unusual for a machine to turn around ten or a dozen times, or skid sidewise for a distance of 300 to 400 feet.

Brown As Host—Will H. Brown, vice-president of the Overland Automobile Co., assisted by his wife, entertained the entire Overland office force in Indianapolis and their friends at a banquet on Tuesday evening, February 22. The banquet was given at the Commercial Club and was followed by dancing and other forms of amusement.

After the Small Boys—The Columbus Automobile Club, of Columbus, O., has started a crusade against snowballing on the part of school boys, which has been the cause of several accidents and many near-accidents on the streets of Columbus during the past few weeks. A letter was sent to the principals of all the Columbus schools requesting them to give the boys a heart to heart talk on the dangers of snowballing motorists.

Does Not Need Sprinklers—The Milwaukee common council has decided not to buy three additional water wagons at $400 each, believing that the use of oil for sprinkling streets will make them unnecessary. It will be necessary to sprinkle streets and parkways only once or twice during the summer, while under the water sprinkling system this was necessary almost every day. The city has purchased 500,000 gallons of crude oil and has erected a distributing plant in one of the largest parks.

Giant's Despair Permit Granted—The borough council of Laurel Run, in whose bailiwick the Wilkes-Barre hill-climb course is located, on Friday last notified President J. H. Perkins, of the Wilkes-Barre Automobile Club, that a permit had been granted for the use of the road for that event on June 11. The permit includes the use of the hill for practice purposes for the 3 preceding days. The entire course will be roped off this year, and an increased force of the state constabulary will assist in guarding it. Two events open only to members of the Quaker City Motor Club will be included in the program, as usual, and the Quakers are already planning for a 3-day club run to the Diamond City for June 10-12.

Must Sign Licenses—J. B. R. Smith, motor vehicle commissioner of New Jersey, has issued a warning that all driving license cards must be signed by the holder. If a driver shows an unsigned card when he is stopped, the matter must be referred to the commissioner for settlement, the supervisors having strict orders not to take matters into their own hands.

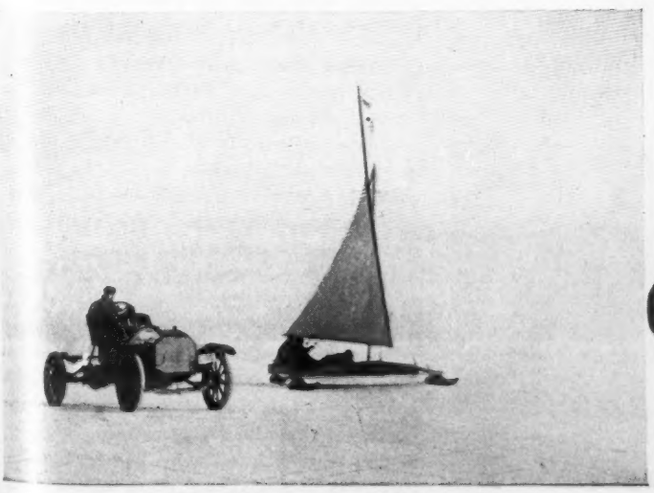
St. Louis Club Rouses Up—The St. Louis Automobile Club, of St. Louis, Mo., has adopted new by-laws, the object of which is to carry out the spirit of aggressiveness assumed by the organization when it recently moved into its new quarters in the Planters hotel. The club realized that the old rules regulating membership admission were not encouraging to those who wished to join, and therefore this feature has been so revised as to provide for non-resident members, abolishing the associate and life membership plan. Ballot election is another new feature. The polls will be open from 12 to 3 p. m. on election days. By the new rules the board of governors is authorized to appoint an executive committee of three, with which will rest the chief control of the club's affairs. Hitherto the board of governors has held all the controlling power and, owing to the many members on this board, it often was found impossible to assemble a quorum. The club previously has operated under by-laws which were practically the same as those of the Automobile Club of America. Under the new by-laws standing committees are provided for, as follows: Legislative committee of five members, membership committee, house committee and auditing committee, limited to three members each; orphans' day committee, limited to seven members; entertainment committee, limited to fifteen members. All these committees are to be appointed soon. The entertainment committee will have work on its hands immediately. Preparations are to be begun as soon as it is organized for the national good roads convention to be held in St. Louis in the fall.

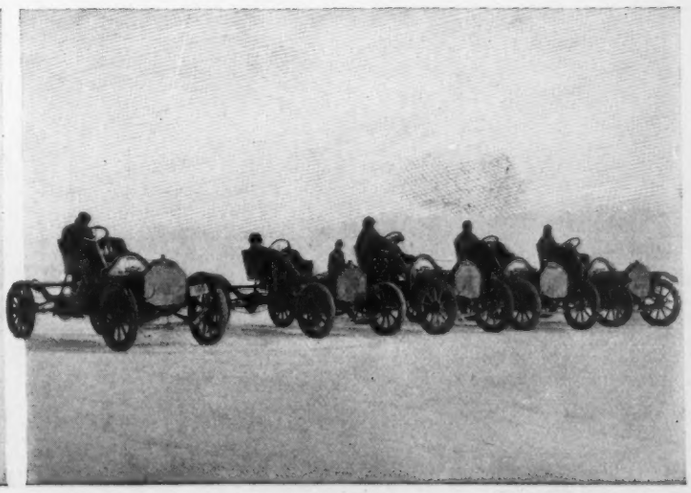
Punishes Joy Rider—Judge James A. Collins, who recently assumed the bench of the Indianapolis police court, has announced that he expects to be severe with joy riders, especially those who run down and injure pedestrians. In the first case of this kind to come before him he has fined Norbert Nagle $250 and costs and sentenced him to 90 days in the workhouse.

Quakers' Contest Committee—President L. D. Berger, of the Quaker City Motor Club, of Philadelphia, has announced the following as the makeup of the contest committee of that organization for the coming twelvemonth: R. E. Ross, chairman; Fred C. Dunlap, A. T. James, G. Hilton Gantert, Paul B. Huyette, Evans Church, George M. Graham and A. E. Maltby.

Savannah's Race Plans—Savannah, Ga., is pushing its claims for a road race. President F. C. Battey recently held a conference with President Speare, of the American Automobile Association, and now it is said that a race will be run. It is also suggested to have two races a day before Thanksgiving, one for the small cars and another for the larger stock cars. Then on Thanksgiving day the big race could be a sort of a free-for-all for any cars not exceeding 6.1 bore.

All-Connecticut Run Dates—It has now been definitely settled that the all-Connecticut endurance run will be held on May 19, 20 and 21. Secretary William T. Plimpton, of the contest committee of the Automobile Club of Hartford, has been so informed by S. M. Butler, chairman of the contest board of the American Automobile Association. The date originally named by the contest board of the A. A. A. was May 1, but this would be a bit too early and the dates originally asked for finally were granted.





CHALMERS TESTERS RACE ICE BOATS ON LAKE ST. CLAIR, MICHIGAN

Among the Makers and Dealers

Dominick Moves—William Dominick's Automobile Machine Shop has been removed from 542 Wabash avenue to 1400 Indiana avenue, Chicago.

Kansas City Events—A. J. Davies is now Kansas City distributor of the Chadwick. The Hollister Motor Co. has been made general factory distributor of the output of the Smith Automobile Co., of Topeka, Kan. The Hollister company has moved to spacious quarters at 3116-3118 Main street.

Parry Plant Growing—The Parry Automobile Co., of Indianapolis, is planning to add to its factory and to manufacture a line of light commercial cars. In preparation for the 1911 output, a four-story building, 700 feet in length, will be erected, and this new building will be used exclusively for the manufacture of motor delivery wagons and trucks.

Start Federal Agency—The Federal Rubber Co. of Illinois has established quarters at 1312 Michigan avenue, Chicago, to handle the Federal tire. Interested in the company are C. C. Harbridge, J. C. Zimmerman, William Seward and Hugo Jackson, who resigned from the staff of the Chicago Michelin branch in order to embark in this new enterprise. Mr. Harbridge's successor as manager of the Michelin branch is Richard Tracy, of Cleveland.

New Concern at Leipsic—The Koeb-Thompson Motor Co., of Leipsic, O., has been incorporated with a capital stock of $300,000 to build pleasure cars and a general line of trucks from designs and patents of Emil Koeb and Ralph P. Thompson. The new company has purchased of the American Foundry Co. plant all assets, including ground and buildings, machinery, equipment, tools, etc., and operations will begin at once. The officers of the new company are as follows: President, Ralph P. Thompson; vice-president, O. P. Edwards; secretary and treasurer, W. E. Edwards; general manager, Emil Koeb.

Twining Moves—In connection with D. C. Boggs, Thomas M. Twining, the Philadelphia Regal-Detroit agent, celebrated the removal of the agency into its new quarters at 330 North Broad street by taking on the sales right for the Mora for the Quaker City and adjacent territory.

Chase Enlargement—The Chase Motor Truck Co., of Syracuse, N. Y., is growing very rapidly. It recently enlarged its plant—a building 200 feet long and 60 feet wide—and is putting in a suite of offices which will include directors' rooms, sales department, sales manager's private office, president's office and general manager's office.

Billings & Spencer Election—At the annual meeting of the stockholders of the Billings & Spencer Co., of Hartford, Conn., the following officers were elected: President and general manager, C. E. Billings; vice-president and superintendent, F. C. Billings; treasurer, L. H. Holt; secretary, E. H. Stocker. The old board of directors was re-elected as follows: C. E. Billings, F. C. Billings, C. M. Spencer, L. H. Holt, Silas Chapman, Jr., E. H. Stocker and L. D. Parker.

St. Louis Events—The Maxwell-Briscoe Motor Vehicle Co., of St. Louis, has leased the first floor space in the Culver building immediately adjoining its present location at Twelfth and Olive streets and will enlarge its salesroom materially. This additional space was made necessary by the fact that the company recently took the agency for the Columbia gasoline car. After many difficulties with a tenant the Colonial Automobile Co. has finally leased salesrooms at 308 North Twelfth street, where E-M-F and Flanders cars will be shown. The building has been remodeled. H. C. Deabold is manager of the Colonial.

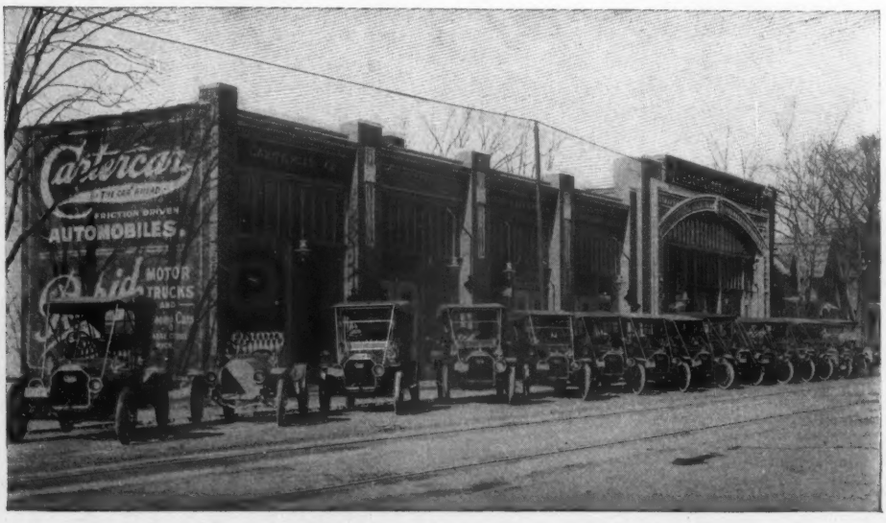
Lozier After Western Trade—Now that the Lozier company has decided to establish a factory at Detroit it is going after western business. In Chicago the Lozier has taken the McDuffee company's store at 1501 Michigan avenue, where it will be handled by an independent company which is being organized.

Has Big Opening—The new Indianapolis branch of the Henderson Motor Sales Co. at 23-25 East Ohio street, Indianapolis, was formally opened during the afternoon and evening of February 23. Hundreds of people of Indianapolis and vicinity visited the new salesroom and souvenirs of flowers were given to visitors. The company will distribute the Cole in Indiana from the Indianapolis branch.

Dines Packard Officials—F. E. Avery, agent for the Packard in central Ohio, located at Columbus, gave a dinner to a number of officials of the Packard company, of Detroit, at the Ohio Club Saturday evening. The party consisted of E. P. Chalfant, sales manager; J. J. Ramsey, auditor, and J. F. Baines, manager of the service department. In addition to these all the attaches of the Columbus agency attended.

Carter Plant Increased—The plant of the Carter Motor Car Corporation, at Hyattsville, Md., is being increased by an additional building of the same plan as the present main building, making a total floor space of 25,000 square feet. Orders for the necessary material, structural steel, lumber and mill work have been placed for this work and the contract for the iron work has been awarded. It is expected that the building will be completed by spring. The enlarged plant will give the factory a production of ten cars per day.

Capital Stock, $1,000,000—The Elkhart Motor Car Co., of Elkhart, Ind., has increased its capital stock from $200,000 to $1,000,000, and plans are already being worked out for the doubling of the present plant, while it is expected that the plant will be enlarged right along until 2,000 men are employed. The company has acquired 1,000 feet frontage on Sterling avenue, where the present plant is located. The company will build its own parts and has already contracted for a large amount of the improved machinery for that purpose. The company is now building the bodies, doing the upholstering, finishing, making the clutches, etc. The engine factory will probably be in operation in 2 months. The officers of the concern are:



DETROIT CARTERCAR BRANCH RECEIVES SHIPMENT FROM FACTORY

President, W. W. Sterling; vice-president, C. L. Monger; secretary, F. O. Hudson, of Westfield, Mass.; treasurer and general manager, J. T. Knott.

Moves to Goodrich Building—Owing to increasing its office force, the Indicator Sales Co., of New York, has removed from its former premises at 1773 Broadway and has taken spacious quarters in the Goodrich building, at 1780 Broadway.

Buys Out Brady—The Chicago Halladay agency at 1421 Michigan avenue, which in the past has been handled by Rufus T. Brady, has been taken over by the Halladay Motor Co., a new corporation, of which Charles M. Hayes is president.

Succeeds Ricketts Company—The Diamond Automobile Co., of South Bend, Ind., filed articles of incorporation with the county recorder last week. The incorporators and directors are: Joseph W. Ricketts, Hannah Ricketts and Grace Ricketts, all of South Bend. This company is the successor of the Ricketts Automobile Co. The company has a capital stock of $50,000.

New Orleans Happenings—Handling the Winton and the Rauch & Lang electric in New Orleans, the Fairchild Auto. Co. has established an agency at 840 Baronne street. L. H. Fairchild is at the head of the new concern. George E. Dicks and D. O. Myatt, under the name of the Myatt-Dicks Motor Co., have taken the agency for the Marmon car and opened up at 811-13-15 St. Charles street. Oliver B. Brown has just opened an agency for the Stevens-Duryea and Overland cars at 605-7 Baronne street.

Moves Two Branches—The Chicago and Baltimore branches of the H. W. Johns-Manville Co. have outgrown their present quarters and both will move to new locations, with more room. The Chicago branch, now on Randolph street, will move to the four-story and basement building at 27-29 Michigan avenue, where it will have 32,500 square feet of floor space. Offices, store and stock rooms will all be under one roof, with ample room for all. The Baltimore office, store and warehouse will be located at 30 Light street.

Abbott Plant Slightly Scorched—A wing of the new factory of the Abbott Motor Co., at Detroit, Mich., was visited by a small blaze about 9 o'clock Sunday evening, February 20. The fire occurred in a recently completed wing of the factory, in which it was planned to install the offices. Those portions of the factory in which material was stored and in which the work of building the car is conducted, were not reached by the blaze, which was quickly extinguished by the prompt work of the fire department. The loss to the building was fully covered by insurance. A. T. O'Connor, sales manager of the company, says that the fire will in no way hinder or delay the production of cars. The offices of the company will be held in the old building on Champlain street for a week or longer, when all signs of the recent blaze will be repaired.

PLANT OF E. H. WILCOX MOTOR CAR CO. AT MINNEAPOLIS

Geyler Chosen President—The annual election of the Chicago Automobile Trade Association was held Monday night, and there being only one ticket in the field the following set of officers was chosen: President, Louis Geyler; vice-president, John H. Kelley; treasurer, Henry Paulman; secretary, Frank E. Sparks; directors, Thomas J. Hay, James E. Plew and George H. Bird.

Franklin Enlarging—The experimental department at the factory of the H. H. Franklin Mfg. Co. in Syracuse is being enlarged to include a room for the assembly of experimental commercial cars. Experimental trucks, taxicabs and other commercial vehicles will be asembled in this room. A part of this space will be devoted to building new body designs for the commercial cars.

Doubling the Hudson Capacity—The Hudson Motor Car Co. has leased two additional Detroit factories in its effort to meet the demand and care for the spring trade. The two factories will give double the present floor space. This arrangement is only temporary, as the Hudson company already has completed plans for a new $500,000 factory, to be built in Fairview. The present Hudson output is now 400 cars a month. The additional floor space afforded by these two factories will practically double production.

Needed in Houston—Houston, Tex., is for the first time to have a couple of complete garages and repair shops. Mayor Baldwin H. Rice is building a three-story garage which will be occupied by the Houston Motor Car Co., the floor space aggregating something over 12,000 square feet. The display space will be devoted principally to the Pierce-Arrow, Cadillac, Oldsmobile and Columbus electric. The George W. Hawkins Machine Co., agent for the Maxwell, will move into a new building in the heart of the city. It will have something like 15,000 square feet of floor space. The Ford Motor Co. have established an agency, with floor space a trifle in excess of 22,500 square feet.

Has St. Louis Branch—The Franklin Automobile Co. is one of the latest firms to establish new branch offices in St. Louis. The Franklin announces that it will occupy its offices here by the middle of March. The company has leased the building at 1306 Olive street.

Rousseau with Overland—A. J. Rousseau, formerly manager of the Chicago Buick branch, has been appointed district manager of the Willies-Overland company for Illinois, Iowa, eastern Nebraska, southern South Dakota, Minnesota, northern Indiana and western Michigan.

Kohl Selling Agent—Fred W. Kohl has established headquarters at 409 State Life building, Indianapolis, as general selling agent for motor accessories, and will handle the lines of the Chicago Windshield Co., the Palmetto Reduction Co. and the line of fire extinguishers made by the H. W. Johns-Manville Co.

Fuller's House-Warming—Alvan T. Fuller had open house at his new service garage depot in Boston Washington's birthday from 10 to 4, during which time several thousand people visited the big plant and inspected the building. All the facilities for caring for Packard and Cadillac cars were explained to the visitors, many of whom have done business with Mr. Fuller for the past dozen years.

Lazarnick Opening Branch—Not content with having established in New York one of the best-equipped and most modern photographic plants in the country, Nathan Lazarnick, the well-known motor car and press photographer, has opened a branch house at 870 Woodward avenue, Detroit, Mich., which will be under the management of Milton B. Kolb. Lazarnick has been photographing for the motor trade practically since its inception, having covered for years past all of the shows, race meets and various competitions.

Brief Business Announcements

Dover, Del.—The Silent Motor Car Co. has been incorporated with a capital stock of $200,000.

Cleveland, O.—The Rambler Automobile Co. has removed from 2158 East Ninth street to 6504 Euclid avenue.

Lansing, Mich.—The Kalamazoo Motor Co., of Kalamazoo, has been incorporated with a capital stock of $15,000.

Trenton, N. J.—Announcement has been made of the appointment of John H. Ashton as local agent for the Regal.

Columbus, O.—The Derain Motor Co., of Cleveland, has filed a notice of the increase of its capital stock from $30,000 to $60,000.

Nashville, Tenn.—A charter has been granted to the Knoxville Auto and Garage Co., of Knox county, which has a capital stock of $50,000.

Atlanta, Ga.—The Georgia Motor Car Co., which is agent for the E-M-F, Flanders and the Benz cars, has removed to its new quarters at 45 Auburn avenue.

Omaha, Neb.—The Sweet-Edwards Automobile Co., which is the local agent for the American, has opened another new garage and salesroom at 2052 Farnam street.

Washington, D. C.—Announcement has been made of the purchase by R. Semes of the Congressional garage, on Pennsylvania avenue southeast. He is to continue the Black Crow agency.

Boston, Mass.—The Grout Automobile Co. has opened headquarters in the motor mart and is to handle the Grout car. The management of the company is to be in the hands of Edward P. Forbes.

New York—The Oldsmobile company has found its quarters entirely too cramped, and has succeeded in leasing the store at 1655 Broadway, adjoining its present establishment on the north.

Philadelphia, Pa. — The Automobile Sales Corporation, which is the agent here for the Cadillac and Peerless, is preparing the erection of a building at 142-144 North Broad street, which is to cost about $500,000.

New York—A change of the local management of the Michelin Tire Co. has taken place. J. W. Hobbs, who has been acting as manager for some time, has resigned and in the future his place is to be filled by J. A. Atwell.

New London, Conn.—The Brown Cotton Gin Co. is planning to go into the manufacture of motor cars. The company just completed a contract for a Massachusetts concern for the construction of motor cars, and with the machinery which was installed for this purpose will now go into the manufacture of cars on its own account.

Dayton, O.—In the future the interests of the Columbia will be looked after by Robert Davis.

Louisville, Ky.—The Banks Motor Car Co., of this city, has been incorporated with a capital stock of $25,000.

New York—B. C. Howell has been appointed superintendent of retail sales for the Franklin company in this city.

Atlanta, Ga.—Plans have been filed for the erection of a three-story garage for the use of the Ford Automobile Co., at 211 Peachtree street.

Boston, Mass.—The Fitchburg Automobile and Cab Co., of Fitchburg, has been incorporated with a capital stock of $50,000. S. M. Nathan is to act as president and treasurer of the company.

Brooklyn, N. Y.—The new garage and salesroom of the Kenny Motor Car Co. is at 1474 Bedford avenue. The company is to represent the Rambler car in this borough, and the members of the firm are William T. and Thomas A. Kenny.

San Francisco, Cal.—Announcement has been made of the appointment of H. P. Smith as agent in San Jose for the Overland, succeeding R. B. Bray. Frank H. Johnson has opened headquarters for the Mora car on Golden Gate avenue.

Allentown, Pa.—The Mack Motor Car Co. has found its business increasing so rapidly that it has been obliged to enlarge its shop, and has transferred a branch to the former building of the Liberty Silk Dyeing Co. The new building has 110,000 feet of floor space.

New York—A. C. Harrington, who for the past 9 years has been one of the salesmen for the Packard Motor Car Co., has severed his relations with that company and has been appointed manager of the sales department of the S. J. Wise Co., agent for the American Simplex.

Harrisburg, Pa.—Articles of incorporation have been filed by the Taylor Motor Distributing Co., of Philadelphia, with a capital of $10,000. W. M. Taylor is to be the treasurer. Another new incorporation is that of the Fanning Motor Co., also of Philadelphia, which has a capital of $10,000.

San Jose, Cal.—R. B. Baggett & Co., who have been establishing a string of garages on the coast, have just opened up an establishment at 35 West San Antonio street, this city, under the management of Charles Harden. The new project is to handle the Baker electric, Walker trucks and electric motor boats. The string of establishments is to be known as the D. & R. garages. S. P. Reed is to be vice president and general manager.

Anderson, Ind.—M. C. Norton has been appointed manager of the Westerfield Motor Co., of this city.

Philadelphia, Pa.—J. M. Myers, agent in this city for the Paige-Detroit, has opened headquarters at 646 North Broad street.

Fort Worth, Tex.—W. P. Fisher has been appointed agent in this city for the Thomas, and will shortly open a salesroom and garage.

Harrisburg, Pa.—Articles of incorporation have been filed by the Bellevue Automobile Co., of Bellevue, which has a capital stock of $10,000.

Akron, O.—C. M. Halstead, who has been connected with the Winton company in Cleveland, has been appointed manager of the Akron Auto Garage Co. and is to locate in this city.

San Antonio, Tex.—Notice has been given of the establishment at Austin of a branch of the C. H. Dean Auto Co., of this city. The new branch is to be under the management of F. M. Covert.

Utica, N. Y.—The Bender Garage Co. has opened a garage at Elizabeth street and Park avenue. The company has the local agency for the Kisselkar, Speedwell, Rider-Lewis, Black Crow and Hupmobile.

Plattsburgh, N. Y.—The Lozier Motor Co. of New York on March 12 will make application to the supreme court of the state of New York for permission to change its name to the Champlain Motor Co.

Harrisburg, Pa.—The Duquesne Auto Parts Co., of Pittsburg, has filed articles of incorporation and will have a capital stock of $5,000. Another incorporation is that of the Fiat Auto Co. of Pennsylvania, which is located in Philadelphia. The new company has a capital stock of $20,000.

New York.—The Atlantic Motor Car Co., which is the local representative for the Stoddard-Dayton and the Courier, is now settled in its new building at 225 West Fifty-seventh street. Three floors of the building are now occupied, and within a short time a fourth will be added to the company's equipment.

Fresno, Cal.—The Pioneer Automobile Co. and the Republic Garage Co. expect to open their new garage in the near future. The Republic Garage Co. is to have the garage and shop, and is also to handle the Republic tires; E. T. Jeffress is to act as manager of the garage, while the interests of the Pioneer Auto Co. will be looked after by A. C. Wheelock.

NEW AGENCIES

Angola, Mo.—F. A. Emerson, Clark
Atlanta, Ga. — Boyd-Patterson Automobile Co., 287 Edgewood avenue, Halladay
Decatur, Ill.—Harvey Stearn, Great Western
Des Moines, Ia. — Sears Automobile Co., Ideal electric
Newark, N. J.—Newark Motor Car Co., Rainier.
Wheeling, W. Va.—H. C. Whittaker, Rainier.
Jamaica, L. I.—Disbrow Brothers, Rainier.
Atchison, Kan. — Gibson Automobile Co., Velie and Detroit electric
St. Louis, Mo.—Whittaker Motor Car Co., Everitt
Pittsburg, Pa. — Hiland Auto Co., Woods electric
Pittsburg, Pa. — Midland Motor Car Co., Midland
Indianapolis, Ind.—Weber Automobile Co., Apperson
Indianapolis, Ind. — Co-Auto Motor Co., Westcott
Green Bay, Wis.—Green Bay Motor Car Co., Regal, Maxwell and Buick
Merrill, Wis.—H. W. Johnson, Ford
Lomira, Wis.—William Beitz, Black Crow
Eden, Wis.—J. E. McCarty, Black Crow
Milwaukee, Wis. — Curtis Automobile Co., Reo
Milwaukee, Wis. — Hicklan-Lauson-Diener Co., R. A. C.
Milwaukee, Wis.—Sanger Automobile Co., E-M-F and Flanders
Lyons, Wis.—J. S. Heiligenthal, Overland
Milwaukee, Wis.—Frankland Automobile & Supply Co., Regal
Brodhead, Wis.—A. L. Allen, Ford
Menomonie, Wis.—V. C. Hensehel, Overland
Columbus, O. — Burdell Auto Sales Co., E-M-F and Flanders
Newark, O.—S. E. Forsythe, E-M-F and Flanders
London, O.—Madison Automobile Co., E-M-F and Flanders
Delaware, O.—Joseph Neville, E-M-F and Flanders
Toledo, O.—Toledo Auto and Garage Co., Everitt
St. Louis, Mo.—Wiemeyer Motor Co., Mora
Columbiana, O. — W. M. Fuhrman, Brush and De Tamble
Kansas City, Mo.—Woodward Automobile Co., 1714 Grand avenue, Babcock electric
Cleveland, O.—Crest Motor Co., 6012 Euclid avenue, Paige-Detroit, Warren-Detroit and Abbott-Detroit
Hightstown, N. J.—T. C. Merros, Buick
Philadelphia, Pa.—D. C. Boggs, 330 North Broad street, Mora
Boston, Mass.—Standard Motor Car Co., Paterson
St. Louis, Mo.—St. Louis Stearns Automobile Co., Fuller
St. Louis, Mo.—Swingly Motor Car Co., Courier
St. Louis, Mo.—Robinson Fire Apparatus Co., Anhut
St. Louis, Mo.—Times Square Automobile Co., Liberty
St. Louis, Mo.—Mound City Buggy Co., Halladay
St. Louis, Mo.—Lindsay Motor Car Co., Cole
St. Louis, Mo.—Lindsay Motor Car Co., Premier
St. Louis, Mo.—Southern Automobile Car & Machine Co., Ohio
St. Louis, Mo.—Whittaker Motor Car Co., Hewitt truck
Kansas City, Mo.—Clark Motor Car Co., Clark

NEW STORES IN BOSTON

Boston, Mass., Feb. 27—The wonderful growth of the motor industry in Boston is shown by the moving into new quarters of three different companies recently, the B. F. Goodrich Co. taking possession of its new building on Boylston street and the Maxwell company occupying the structure on Massachusetts avenue that had been changed over for them, the Columbia agency also moving there. The Goodrich building is an entirely new structure built for the concern, while the Maxwell place is a modern building reconstructed on the inside.

There is room for some 800 cars in the Maxwell home, for the total area is 98,000 square feet. There are five floors and two basements. The average space for each floor is more than 19,000 square feet. On the lower floor the Maxwell has its sales and show rooms at the corner of Newbury street, and the Columbia and Stearns agencies, handled by J. H. MacAlman, also has a large salesroom on the street floor. The rear is for cars that are in constant use. On the second floor front the private office of Manager F. J. Tyler and the offices for the Maxwell clerical forces are located. Part of this floor will be used for storing new cars awaiting delivery to owners.

The third floor is used by Mr. MacAlman to house and repair Columbia and Stearns cars. It is divided into stock, repair and storage sections. On the fourth floor Mr. Tyler has divided the space so that one section is given over to the making of tops and slips entirely, not alone for Maxwell but for other cars. Another section will take care of the repairs to lamps and other parts made of brass. The rest of the floor is for garaging cars. On the top floor the repair shop and stock room is located. All duplicate parts for each model of a Maxwell is carried. Modern machinery has been put in and a large repair force has been engaged. In all more than 100 men are employed there. The two basements are large and well lighted. Cars will be garaged there for persons who wish to keep them out of commission for any length of time. The building and its remodeling represents an expenditure by the Maxwell company of nearly $400,000.

NEW GOODRICH STORE IN BOSTON

The Goodrich building is ideally located for a tire branch, being on Boylston street, right in the heart of the motor colony. It is a six-story structure with a total floor space of 30,000 square feet. The branch employs sixty men. The building is of reinforced concrete with granolithic floors. The salesroom is on the first floor, taking up almost the entire width of the building. In the rear is the shipping room.

RECENT INCORPORATIONS

Rochester, N. Y.—W. H. Rowerdink & Son Co., capital stock $100,000; to manufacture motors and other vehicles and farm implements.
Jersey City, N. J.—Blakeslee-Britten Co., capital stock $50,000; to manufacture motor cars, etc.; incorporators, G. E. Blakeslee, E. F. Britten and E. E. Downes.
Chicago—Auto Specialties Mfg. Co., capital stock $50,000; to engage in the manufacture of vehicles and appliances; incorporators are not given, the new company being a California corporation which seeks incorporation under the laws of this state.
Amsterdam, N. Y.—Merriam & Howland Auto Co., capital stock $15,000; to engage in the renting, storing and repairing of motor cars and parts thereof; incorporators, N. L. Finch, W. J. Merriam and F. L. Howland.
New York—Laminated Tire and Tube Co., capital stock $5,000; to manufacture and deal in tires and tubes and other articles in which rubber, leather or metal is a factor; incorporators, D. J. Wagner, P. M. Pelletreau and C. M. O'Farrell.
Buffalo, N. Y.—Powell Motor Co., capital stock $10,000; to deal in motor cars and motor vehicles of all kinds, as well as maintaining garages; incorporators, J. W. Powell, D. F. Churchill and G. M. Wolfe.
New York—Fleischmann Vehicle Co., capital stock $25,000; to engage in the manufacture of carriages, motor cars and vehicles of all kinds; incorporators, O. F. Fleischmann, R. H. Fleischmann and P. Damm.
Augusta, Me.—L. A. W. Motors Co., capital stock $1,000,000; to manufacture engines of all kinds. E. M. Leavitt is to be at the head of the concern.
Watertown, N. Y.—Gould Automobile Co., capital stock $500; incorporators, W. A. and W. L. Gould and W. S. Rice.
Indianapolis, Ind. — Commercial Car Co., capital stock $100,000, to engage in the manufacture of motor cars; incorporators, I. V. Buckley, H. T. Huff and E. B. Walker.
Trenton, N. J.—American Taxicab Co. of Pittsburg, capital stock $50,000; incorporators, V. A. Murray, J. R. Bradley and H. G. Elliott.
Newark, N. J.—Newark Motor Car Co., capital stock $50,000, to engage in the manufacture of motor cars, motor cycles, etc.; incorporators, J. M. Schwerin, F. Dudley and A. A. Russell.
Fablus, N. Y.—W. King Smith Co., capital stock $20,000, to deal in motor vehicle accessories and supplies; incorporators, N. K. and H. L. Smith and Harvey M. Hoyt.
New York—Atlas Chain Co., capital stock $350,000, to manufacture anti-skid chains and motor car appliances; incorporators, G. E. Holmes, D. Milliken and K. K. McLaren, all of New York City.
New York—Vinot Automobile Co., capital stock $37,500, to manufacture motors, engines, motor cars, etc.; incorporators, H. S. Lake, A. H. Peyser and S. Kjelsen.
Memphis, Tenn.—Jerome P. Parker Co.; capital stock $100,000, to engage in the manufacture of motor cars, bicycles and carriages; incorporators, J. P. Parker, M. P. Patterson and J. E. Squire.
Chicago—Barray-Ivor-Turner Mfg. Co., capital stock $15,000, to engage in the manufacture of motor car supplies; incorporators, F. Freer, J. A. Peterson and C. A. Burler.
Chicago—National Automobile Co., capital stock $5,000, to deal in motor cars and accessories; incorporators, F. A. Hart, A. F. Aldington and I. M. Pearson.

Legal Lights and Side Lights

MUST EXERCISE CARE

A RECENT decision in Wisconsin would seem to indicate some lingering traces of animosity against the motor car and a decided lack of anything approaching sympathy with the driver and occupants under certain conditions. In Gauson vs. Town of Fond du Lac, 123 N. W., Wisconsin, 629, the court in part says:

The question for this court to solve is whether the driver of a motor car who, on a dark, rainy night, is traveling over a straight stretch of strange country road, is exercising ordinary care if he drives his machine at such a rate of speed that he is unable to stop within a distance that is within the clear range of his vision. Stated in another way, if he can see objects but 10 feet ahead, while he cannot stop his car in less than 20 feet, is he using ordinary care? If not, and injury results from his negligent act, neither he nor his passengers, if the conveyance be a private one, can recover damages for such injury. Self-propelling machines of great weight and high power have come into general use in the past few years. They are rightfully accorded the same privileges in the use of our highways that are accorded to other vehicles. When driven at a reckless rate of speed, they are a source of constant menace to their occupants, and to the traveling public, which has not and cannot abdicate its right to use our roads. What may be a moderate rate under some circumstances may be a reckless rate under other conditions.

The driver of every motor car in a city knows that streets are frequently torn up for the purpose of repairing or rebuilding them, and for the purpose of laying water and sewer pipes, and for laying gas mains. * * * He further knows that children, pedestrians, bicycle and motor cycle riders, street cars and passengers carried by horsepower are to be found on the streets in great numbers, and frequently huddled close together. The driver on a country road knows that culverts and bridges must be rebuilt; that highways must be repaired; that washouts occasionally occur; that live stock roam about the roads unattended; that travelers on foot, on horseback and in various kinds of vehicles are found using the highways at all seasons of the year, and at all times of the day and night. Such a driver has no right to expect, and does not expect, a free and unobstructed right of way over a well-defined track, as does the engineer of a locomotive, or even the motorman of an electric car. The motor car has created a new peril in the use of our public highways, a peril that unfortunately has been greatly enhanced by the recklessness of drivers who propel such machines with the speed of railroad trains along crowded thoroughfares. Some rule consonant with the public safety, and not unduly harsh or restrictive upon the users of motor cars, must be evolved to meet a situation which has recently arisen. No case presenting a similar state of facts has been cited by counsel.

It seems to us, and we decide, that the driver of a motor car, circumstanced as was the driver of the car in which the plaintiff was riding, and operating it under such conditions as he operated his machine on the night of the accident, is not exercising ordinary care if he is driving the car at such a rate of speed that he cannot bring it to a standstill within the distance that he can plainly see objects or obstructions ahead of him. * * * This, it seems to us, is the minimum degree of care that should be required.

A NEW JERSEY QUESTION

An extremely interesting case on the question of the constitutionality of the New Jersey motor statute which requires a license from both cars and drivers is found in Cleary vs. Johnston, 74 Atl., New Jersey, 538. The complaint was that R. H. Johnston drove a motor car in the streets of Trenton, N. J., without having his motor car licensed and registered according to the law of New Jersey, and without having paid his registration fee. The facts, without contradiction, were that Johnston, who had his car properly registered and licensed in the state of New York, his place of residence, was driving his car through Trenton en route from New York to Philadelphia. He was arrested in Trenton for not being registered in New Jersey and for not having a New Jersey motor license. On these facts a penalty of $100 was assessed by the common pleas and an appeal taken.

The New Jersey law provides in substance that every resident and non-resident of the state, whose car shall be driven, shall, before using such car on the public highways, register the same; and that no motor vehicle shall be driven unless so registered. The statute further provides that an annual fee of $3 for registering a motor car of less than 30 horsepower and a fee of $5 for each car of 30 horsepower or more shall be charged, and further provides for a fee of $1 for a license to the driver of the first class of motor cars and a $2 license for a driver of the second class. There was no dispute but that Johnston had violated the statute just described, but an attack was made upon the constitutionality of the statute.

The court held on appeal that the statute which required every resident and non-resident owner of a motor car to procure a license to drive such car, to register the same and to pay for such license, was constitutional.

"These registration requirements were within the legitimate exercise of the police power for the purpose of securing the safety of the public in its use of highways against the danger of this new use by powerful, rapidly-moving machines, which require careful and skillful drivers," said the court. "Assuming that the right to use the highways belongs to such non-resident owner, yet it is obviously not an absolute right. The stringent legislative restrictions upon the use of the highways by motor cars, which restrictions have received judicial approval, exhibit the fact that the motor car is regarded as a dangerous engine, if used otherwise than under the control provided by the legislature.

"I am of the opinion that the condition imposed that a man who proposes to use our highways for motoring shall agree to submit himself to the courts of the state into which he comes, as far as concerns matters growing out of such use, is neither unconstitutional nor unreasonable, in my opinion.

Legal Angles of Motoring

No. 1

Whether or not a garage man can keep the car of a customer in lieu of payment of bills incurred by a client is a question that often comes to the mind of the keeper of a motor livery, and often he has recourse to legal advice as to his rights in the case. Not all lawyers are familiar with the fine points in this matter, but Xenophon P. Huddy, a New York lawyer, discusses this point in the Law of the Automobile, pointing out how and when such a course may be taken. Mr. Huddy discusses a New York case, Smith v. O'Brien, 46 N. Y. Misc. Rep. 325, 94 N. Y. Supp. 673, in which this point was decided. The decision was that unless the garage man has the foresight to stipulate beforehand the right to obtain possession of the car in case of non-payment of charges, he cannot hold the machine where the owner is allowed to use it at any time he so desires, for where the car is used by the owner the garage keeper's possession is not continuous, so that the keeper has no lien for his charges and cannot retain possession of the car to enforce payment. The law says, according to Mr. Huddy, that a surrender of possession surrenders the right to a lien and that the credit in such a case is supposed to have been furnished on the bailor's personal responsibility only, and no recourse against the property bailed is supposed to have been contemplated. Where, however, continued unbroken possession is had by the garage keeper he is, like the warehouseman and wharfinger, under the common law and the various statutory provisions of the states, entitled to retain the property for his charges.

INVOLVING SALE OF CAR

A car was sold by defendant to plaintiff, the terms being $600 in cash and a credit of $400 allowed by defendant to plaintiff for a second-hand car, which plaintiff turned over to defendant. Plaintiff claimed that the electric machine sold to him did not come up to the guarantee of defendant that it should run 20 miles on one charge. Plaintiff, however, kept the machine; it became his property, and he made no effort to return it to defendant. On these facts it was held that the plaintiff could not rescind the contract of sale, but that his only remedy was an action for damages for the breach of the warranty made by the defendant. It also appeared that after plaintiff had purchased the machine he had it repaired several times by defendant at his—plaintiff's—request, and a counterclaim filed by defendant for the value of the repairs so made was allowed by the court in the case of Wirth vs. Fawkes, 123 N. W., Minnesota, 661.